ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

A submarine cable has been laid and is now open for business between Bermuda and Turks Island (in the West Indies). The cable is owned and will be operated by the Direct West India Cable Company, working in connection with the Commercial Cable and Postal Telegraph companies. The rate from New York city to Turks Island will be 56 cents per word.

A contract has been signed in San Francisco for 520 additional stamps for the Treadwell mines, Alaska. With these the mines will have 880 stamps, the largest number on a single ledge in the world. These stamps will crush 2,860 tons of ore daily, or 858,000 tons in a working year. The Treadwell company has also under consideration a $400,000 electric plant.

North Tonawanda, N. Y., will soon have electric power from Niagara Falls. The Tonawanda Power and Conduit Company expects to be able to deliver the Falls energy to customers by May 1, and perhaps sooner. Plans are already under way for building and equipping a power sub-station in North Tonawanda and work on the structure will be begun within a few weeks. Among the companies that are considering the use of Falls power are the Tonawanda Lighting and Power Company and the Houix Manufacturing Company, which recently removed to North Tonawanda from Ohio.

A new high-efficiency incandescent lamp is being introduced by the Edison & Swan United Electric Lighting Company, Limited, of London, as a result of a long investigation carried out by Mr. Swan, says *Engineering*. The new lamp takes 2¾ watts per candle, and has a practically constant efficiency and light during its whole life of between 400 and 500 hours. In short, the "smashing" point is said to be never reached with this lamp, as the filament ruptures before the light has sensibly diminished. A large number of the lamps have been used by Mr. Swan during the past 12 months, with, it is stated, very excellent results. At present the new lamps are made only in the 16-candle-power size, but the other standard sizes will shortly be put on the market.

The Westinghouse Electric and Manufacturing Company, of Pittsburgh, recently received a cablegram from its Rome representative announcing that he had closed a contract for lighting the catacombs of St. Callistus, St. Agnes, St. Cyriaca, St. Domitila, St. Priscilla and St. Pontianus. Some months ago the subterranean burial-ground of St. Callistus was lighted, and the effect was so satisfactory that the persons in charge decided to have electricity put in all the catacombs of the city. Six dynamos, capable of supplying current for 450 lamps, will be placed in the six catacombs. The dynamo to be placed in St. Callistus's catacomb will generate power to run an elevator from the entrance of the building on the surface.

The executive committee of the Boston Elevated Railroad Company has ordered the purchase of 128 open cars and 30 box cars for the West End road. The box cars and 30 open cars are to replace those burned recently in the Everett fire. The Elevated people are well advanced with their plans for construction of the elevated structure, and they will shortly be submitted to the railroad commissioners and Mayor Quincy for approval.

Electric Power Transmission To Lyons, France.

A London contemporary announces the completion of a mighty scheme for utilizing the current of the river Rhone, about 15 miles above Lyons, for the generation of electromotive force. It is estimated that over 50,000 electrical horse-power can be delivered to the city from this source, and that, after supplying public and private lighting and running the street railways, a large surplus will remain for the use of factories and the thousands of house looms on which the bulk of Lyons silk is made. By-and-by flat countries will be at a discount; the mountaineer, associated hitherto with freedom, poverty and airy independence will be the busiest artisan, and the distribution of mankind be determined by the position of the torrent or the waterfall, heretofore left as a rule to the solitude of their majestic surroundings.

FIG. 1.—THOMSON INDICATING WATTMETER.—(See page 55.)

Architect of the New Brooklyn Electric Light Station.

Thomas E. Murray, of Albany, N. Y., is the architect of the new station to be erected in Brooklyn by the Kings County Electric Light and Power Company. The designs are said to be the most comprehensive ever made for a similar station, and the building, when completed, will undoubtedly embody every convenience and improvement known to the most modern practice. It is to be finished early in the year, the entire plant to be in running order by May 1.

NORTHWESTERN ELECTRICAL ASSOCIATION.

AN INTERESTING MEETING.

SIXTH ANNUAL CONVENTION HELD AT MILWAUKEE.

PROCEEDINGS OF THE MEETING—THE ADDRESSES—A LARGE ATTENDANCE—MR. F. A. COPELAND IS THE NEW PRESIDENT.

WEDNESDAY MORNING, JANUARY 19.

The sixth annual convention of the Northwestern Electrical Association met in the clubroom of the Hotel Pfister at Milwaukee, Wis., on January 19, 20 and 21. The convention was called to order at 11 o'clock A. M., on January 19, by president H. C. Higgins, of Marinette, Wis. After roll-call the minutes of the fifth semi-annual convention were accepted as printed. The president read his annual address, and the secretary and treasurer presented his report, which was unanimously accepted and adopted.

The secretary then presented 42 applications for membership in the association, as follows:

Westinghouse, Church, Kerr & Co., 1205 New York Life Building, Chicago, Ill.

S. S. Noff, superintendent O. E. R. R., Great Northern Hotel, Chicago.

Bryan-Marsh Co., 136 Liberty street, New York.

H. L. Brintnall, secretary and treasurer Quips Electric Light Co., Saginaw, Mich.

Fred N. Bosson, electrician C. & H. M. Co., Calumet, Mich.

J. S. Porteous, secretary and treasurer Minneapolis International Electric Co., Minneapolis, Minn.

The National Switch and Signal Co., 1237 Monadnock, Chicago.

Western Electric Co., Chicago.

The Electric Storage Battery Co., Frank H. Clark, manager, 1543 Marquette Building, Chicago, Ill.

Diamond Electric Co., 1202 Fisher Building, Chicago; factory, Peoria, Ill.

C. H. Wilderming, consulting engineer, 1515 Old Colony Building, Chicago.

Robert E. Richardson, consulting

engineer, 1405–1412 Manhattan Building, Chicago.

Cedar Rapids Electric Light and Power Co., Cedar Rapids, Iowa.

Wm. Chandler, Edison Sault Electric Co., Sault Ste. Marie, Mich.

W. F. Kingan, manager Edison Sault Electric Co., Sault Ste. Marie, Mich.

John H. Culvert, Decatur, Ill.

G. E. Yost, Portage, Wis.

E. L. Draffen, 625 Marquette Building, Chicago, Ill.

Thomas Duncan, electrical engineer, Fort Wayne, Ind.

Kohler Brothers, electrical machinery, 1648 Monadnock Building, Chicago, Ill.

W. D. Chapman, manager of the Akron Street Railway and Illuminating Co., Akron, Ohio.

C. G. Guild, secretary Jenney Electric Light and Power Co., Fort Wayne, Ind.

M. B. Wheemer & Co., electrical construction, apparatus and supplies, Grand Rapids, Mich.

Electrical Engineering Co, by Geo. E. Hayford, secretary and treasurer, electrical supplies, Chicago.

Rohn & Meyer, contractors, Milwaukee.

O. G. Goodrich, vice-president Twin City Rapid Transit Co., Minneapolis.

F. D. Mack, electrical engineer, 1511 Monadnock Building, Chicago.

F. B. Badt, president Meysenburg & Badt, 1504 Monadnock Building, Chicago.

J. S. Loomis, Cheboygan, Mich.

Baraboo Gas and Electric Light Co., Baraboo, Wis.

Fred D. Nims, assistant superintendent Muskegon Electric Light Co., Muskegon, Mich.

Cloos Electrical Engineering Co., manufacturers electrical appliances, 342 Broadway, Milwaukee.

Chas. S. Kehler, Dearborn Drug and Chemical Co., Milwaukee, Wis.

E. D. Alexander, Chicago, Ill.

O. P. Kissel, Hartford, Wis.

H. O. Channon, manager Empire Light and Power Co., Quincy, Ill.

Charles L. Bulingham, secretary McDermid Manufacturing Co., 207 South Canal, Chicago.

J. B. Morrill, superintendent Evanston Electric Illuminating Co., Evanston, Ill.

E. G. Cowdery, Beloit Electric Light Co., Milwaukee.

A. E. Smith, president Beloit Electric Light Co., Milwaukee.

C. G. Gilman, electrician Chicago, Milwaukee & St. Paul Railway, 174 Wisconsin street, Milwaukee, Wis.

J. H. Andrews, Owasco Electric Light and Power Co., Reed City, Mich.

I. D. H. Ralph, president and general manager of Owasco & Corunna Traction Co., Owasco, Mich.

J. T. Foster, chief engineer, Belle City Electric Railway Co., Racine, Wis.

B. J. Shockley, electrician Culver Electric Light Co., Decatur, Ill.

On motion the rules were suspended and the secretary was instructed to cast a blanket ballot for the admission of all the applicants. The motion was carried. The official programme of the meeting was presented and adopted, after which the meeting adjourned to 2 o'clock the same day and place.

WEDNESDAY AFTERNOON, JAN. 19.

The afternoon session was called to order by the president at 2.30 o'clock. Mr. W. W. Bean moved that the chair appoint a committee of three to nominate officers and directors for the ensuing year. The motion was seconded and unanimously carried. The president appointed a committee as follows: W. W. Bean, chairman; H. L. Doherty and Pliny Norcross. A telegram was read from Mayor Desnoyers, of Green Bay, Wis., regretting his inability to be present at the convention and inviting the association to hold their semi-annual meeting at Green Bay in July.

Mr. Bean, as chairman of the nominating committee, reported the following names as the choice of the committee for officers for the ensuing year: President, F. A. Copeland, La Crosse, Wis.; first vice-president, James R. Dee, Houghton, Mich.; second vice-president, P. H. Korst, Racine, Wis.; secretary and treasurer, Thomas R. Mercein, Milwaukee. Directors, E. L. Debell, of Sheboygan, Wis., chairman; George L. Thayer, of Belle Plaine, Iowa, and S. B. Livermore, of Winona, Minn. On motion, duly seconded, the rules were suspended, and the secretary was instructed to cast the vote of the convention for the officers named.

The newly elected president was escorted to the chair by a committee, was introduced to the association by Mr. Bean, and in a modest and brief address accepted the office and urged upon all the members to make the association a thorough practical working organization. The president then called for the report of the Protective Committee, which was presented by its chairman, Mr. Pliny Norcross. After debate the consideration of the committee's report was postponed, and a resolution was unanimously carried to strike from the record of the proceedings the debate upon the subject of the report. The report of the Committee on Ways and Means was called for, but as the report was not ready no action was taken. The Committee on Programme and Entertainment presented a printed programme.

Mr. Bean, as chairman of the special committee on Municipal Ownership, stated that the committee desired further time. He had not had time to confer with the other members of the committee and expressed a desire to have the matter of the report taken up in executive session. Mr. Bean's request was granted.

The question of holding the next meeting of the association in Duluth, Minn., or Superior, Wis., was brought up and a novel plan of transportation was outlined by Mr. Cross. At the request of Mr. Bean, a committee of six was appointed to consider the matter and to bring up the subject later on in the meeting.

The secretary moved that Messrs. C. E. Van Bergen, F. S. Walker and J. M. Hill, of Chicago, be transferred to the active list of membership. The motion was seconded and unanimously carried. Mr. Alexander Dow, of Detroit, then read his paper on "Electric Lighting For Profit." Mr. Bean moved that the paper be accepted and spread on the minutes of the meeting and that a vote of thanks be extended to Mr. Dow.

At this point the question of municipal ownership was taken up and discussed. Mr. Bean, however, moved that the discussion be stricken from the minutes as far as the reports to the newspapers were concerned, and that on adjournment the subject of municipal ownership be taken up at the proper time. The motion was seconded and carried.

The president appointed as a committee on the next meeting place, to consider the invitations which had been presented and to make a report to the convention, Messrs. Bean, Norcross, Livermore, Debell, Higgins and Paige. The meeting then adjourned to 10 o'clock A. M. on January 20, at the same place.

THURSDAY MORNING, JANUARY 20.

The meeting was called to order by President Copeland at 10.40 A. M. A motion was made, seconded and unanimously carried, transferring H. G. Underwood from the associate to the active list of membership.

The following applications for membership were presented, and the secretary was instructed to cast the ballot of the association for the applicants as members of the association, which was accordingly done. The applicants were the following:

R. M. Heskett, manager McCartney Electric Light and Railway Company, Green Bay, Wis.; Chas. Hartman, president Commercial Light and Power Company, Duluth, Minn.; Manhattan Light, Heat and Power Company, by Smith Taylor, manager, St. Paul, Minn.; Alonzo G. Collins, M., E., 608 Pabst Building, Milwaukee.

Lieut. Francis Badt, of Chicago, then made an address on the subject of "Topics of Interest to Central Station Men."

The thanks of the convention were unanimously tendered to Lieutenant Badt for his address.

Mr. Norcross moved that the committee on fixing place of next meeting be granted further time, to report at 4 o'clock Thursday afternoon. The motion was seconded and unanimously carried.

Mr. W. H. Edgar, of Illinois, then addressed the convention on the subject of "Physical and Chemical Properties of Volatile Oils in Boilers."

After a discussion at some length by Messrs. Thayer, Ralph and Norcross of Mr. Edgar's paper, a vote of thanks was extended to him for his valuable address.

Mr. De Land then read a paper written by Mr. John C. McMynn, of Illinois, on the subject of "Practice of Theory."

A membership application from the Viscosity Oil Company, of Chicago, was then presented and the applicant was unanimously elected a member of the association.

The secretary then read the following letter from Mr. Henry C. Payne:

THE MILWAUKEE ELECTRIC RAILWAY AND LIGHT COMPANY,
MASONIC BUILDING,
MILWAUKEE, WIS., Jan. 20, 1898.

THOMAS R. MERCEIN,
Secretary, City.

MY DEAR MR. MERCEIN: I am in receipt of your very kind invitation to attend the banquet to be held at the Pfister Hotel this evening.

I regret that I am constrained to decline the invitation, owing to circumstances which are beyond my control, my physician having advised that it is unwise for me to participate in such festivities at present.

Please convey to your association my kindest regards. I trust that their meeting here has been a profitable and instructive one. Very sincerely yours,

HENRY C. PAYNE.

A paper was then presented on the subject of "Present Efficiency of Incandescent Lamps," by Mr. John E. Randall, of Missouri. During the reading of the paper Mr. Randall said:

I do not believe it is generally known that the ordinary gas burner decreases very markedly in its efficiency after a very short time; an entirely new tip will give a much brighter light than one that has been used a comparatively short time. That is true of all our illuminating devices in gas. The Welsbach mantle is a remarkable instance; it has an intense brilliancy for a short time, which is very quickly lost.

A unanimous vote of thanks was extended Mr. Randall for his able paper. A recess was then taken until 2 P. M. the same day.

(Continued on page 60.)

MULTIPLE-RATE METERING.

BY EUSTACE OXLEY.

Since completing the article relating to double-rate metering,* the author's attention has been directed to inquiries concerning several points which it was thought unnecessary to consider in the space at his command. These questions relate, in part, to that form of the system in which a ground circuit is used; and as economic construction will award this form the preference, as it entirely dispenses with a separate metallic control circuit, and thus avoids the expense of tearing up pavements to lay it, it seems essential to point out the only difficulty that has been suggested to the writer, and to describe briefly the very simple means by which this difficulty, which had been anticipated, is entirely removed.

Wherever the ground circuit is used it is evident that an accidental ground at any point upon the system may operate every controller, and, by prematurely throwing the armature bar over toward the magnet energized by the circuit that is closed through such an accidental ground, the meter registration at every point will, from that moment, be at the wrong rate. Unless this disturbance is corrected without delay the results may be serious. If the ground occurs during the low-rate period the consumers are the sufferers—for a comparatively short period might be enough, where current is used for power, to largely affect the monthly bills. But the generating company, while an involuntary gainer in a momentary sense, may lose even heavily in the diminished confidence of the consumer, and is fortunate if it escapes strong suspicion of having employed dishonest methods.

To effectually guard against all objectionable results possible from such disturbances, by automatically restoring the controllers to the condition that corresponds to the rate the meters are registering, when the ground occurs, a very simple apparatus is placed at the central station at any convenient point. It is shown in diagram in Fig. 4 herewith, and consists of electro-magnets A and B; the first terminal of the magnet A being connected to the positive side of the system and the second terminal carried to a clip C. The terminals of the magnet B are connected to the neutral and to a clip D lying opposite the clip C. Between these clips is a single knife E, carried by an insulated bar supported by the armature F. Upon the same side with the clip D is a clip G, and opposite it is a similar clip H, so arranged that, when thrown by the electro-magnets, the knife will enter both clips on the side to which it is thrown.

*See ELECTRICAL REVIEW, January 5 and January 12, 1898.

At a convenient point is a switch consisting of two arms J, J^a, pivoted at one end, and connected by a pivoted insulating bar K. Thus, when moved in unison, one arm may be placed

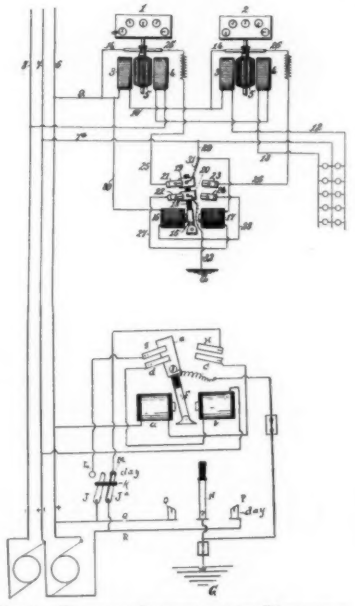

FIG 4.—DIAGRAM ILLUSTRATING MULTIPLE-RATE METERING.

on a contact L and the other removed from a contact M, or vice versa. The small, single-pole, double-throw switch—the arm N being preferably held by a spring out of its clips O and P—is the control switch used at the central station. Its clips are connected to the positive and neutral by wires Q and R, respectively.

It will be noticed that the apparatus bears striking resemblance to the controllers. Its construction is varied but slightly, and there is no increased complication. The operation is as follows:

As shown in the diagram, the controllers have brought the day rate into registration. This has been done by first moving the connected arm J, J^a to the position shown, and then closing the arm N in the clip P. Upon releasing this arm it is thrown out of the clip, as shown, by a spring or other suitable means. The circuit completed by it has not only operated all the controllers on the system, but has also energized the magnet A and thrown the knife E into the clips G and D.

It will be seen that the controllers were last operated from the neutral side of the system, and therefore, should a ground occur upon either the positive or negative, the magnet B will be energized, drawing the knife E out of the clips in which it lies and into the opposite clips. As it enters these clips the positive is again grounded, and all the controllers are restored to their original position. As the ground is of short continuance, the knife E is automatically restored to the position shown in the diagram. As some of the controllers may be sluggish, it is well to retard the movements of this knife by a dash-pot, or other suitable means, to give time for the complete restoration of all.

WILLIAM BERRI, PRESIDENT OF THE BROOKLYN BRIDGE DURING 1897, AND WHO PLANNED THE USE OF THIS GREAT THOROUGHFARE FOR THE TROLLEY AND ELEVATED RAILROADS.

An advantage is obtained by winding the controller switches for 200 volts. Not only do they then require less current for their operation, but they are controlled from the central station by grounding either the negative or positive side of the system. A ground on the neutral, therefore, as it results in 100 volts only, does not affect the controllers, such a pressure being insufficient for their action. Thus disturbances due to accidental ground upon the neutral are excluded. Moreover, if a ground occurs on the side from which the controllers were last operated no disturbance can result. The liability of such disturbances is thus greatly reduced. When they do occur, the results that follow will be instantly corrected in the manner and by the means described.

Ex-Mayor L. W. Hess has been appointed receiver for the Ottawa, Ill., Electric Street Car Company, of which W. F. Ellis, of Boston, is president. The company was organized last year with a capital of $100,000.

TROLLEY CARS CROSS THE EAST RIVER BRIDGE.

A LARGE NUMBER OF OFFICIALS AND CITIZENS MAKE THE ROUND TRIP OVER THE BRIDGE AS THE GUESTS OF THE TROLLEY COMPANIES.

What might be termed the formal opening of the great Bridge connecting New York and Brooklyn to the use of trolley cars occurred Saturday forenoon of last week. Four special parlor cars made the round trip, starting from the vicinity of City Hall, Brooklyn, at 10.30 A. M. The first car made the round trip over the great Bridge in 12 minutes. It was occupied by president C. L. Rossiter, of the Brooklyn Heights Railroad Company; Col. T. S. Williams, secretary; and invited guests, among whom were Hon. William Berri, president of the Bridge corporation during the past year; Mr. W. D. Sargent and Mr. Frank Sanger Snow, of the New York & New Jersey Telephone Company; Mr. Charles W. Price, of the ELECTRICAL REVIEW; Mr. A. Abraham, of Abraham & Straus; Hon. W. B. Davenport, Mr. Seth L. Keeney and Col. George A. Price. The car was welcomed at the New York end of the Bridge by the newly appointed Bridge Commissioner, Hon. John L. Shea, and his assistant.

The curve at the New York end was easily turned without difficulty. The second car was run across the Bridge by president A. L. Johnson, of the Nassau line, and party of guests; and another parlor car of the Brooklyn Heights Railroad Company, containing Bridge superintendent C. C. Martin and party, and a parlor car of the De Kalb Avenue line, with President Heins in charge, also crossed the Bridge.

The passage of the cars was welcomed with cheers at both ends of the line, and it was evident that their advent was highly popular.

One loop is finished, three others will be completed shortly; meanwhile a few cars will run over each day to familiarize the motormen with the situation.

Hon. Wm. Berri, of Brooklyn, is the progressive official under whose administration, as president of the Bridge trustees, the agreement was entered into with the trolley companies and the elevated roads of Brooklyn for their cars to cross the Bridge, charging only one fare to passengers. The saving in expense and in time in the aggregate is very great. The ELECTRICAL REVIEW believes that this extension of transit facilities will prove highly successful and popular, and congratulates Mr. Berri and the railroad officials on the auspicious opening trip made on Saturday last.

TELEPHONE NEWS AND COMMENT.

A bill was introduced last week in the Ohio Legislature providing for municipal ownership of telephone plants.

The Western Union Telegraph Company's new copper line between San Francisco and Chicago is now in use. The line was constructed in 60 days at a cost of $200,000, the distance being 2,000 miles.

At a meeting of the directors of the Home Telephone Company, of Cleveland, Ohio, the following officers were elected for the ensuing year: Howell Hind, president; F. M. Stearns, vice-president and general manager; F. W. Price, secretary; A. L. Davis, treasurer.

The Central Union Telephone Company has sold $2,125,000 of its $3,000,000 authorized bond issue. This gives the company all the funds it will require for extensions to July 1, and sufficient to liquidate its entire floating debt. The remaining bonds will be sold during the year.

The Mercer County, Pa., Telephone and Telegraph Company, at their annual meeting, elected Dr. L. R. Heath, president; G. K. Smith, vice-president; J. J. Alexander, secretary; John Gordon, treasurer. The report shows an increased volume of business over last year.

The $1,000,000 Erie Telegraph and Telephone Company five per cent collateral trust gold bonds, for which subscription closed on January 15, were all taken by investors. This five per cent bond, of which there are now outstanding $2,000,000, has about 28½ years to run, and nets the purchaser at 97 about 5.20 per cent.

The Pacific Postal Telegraph Cable Company, of New York, certifies to an increase of its capital stock from $800,000 to $1,000,000. The debts and liabilities of the company are $142,727. Charles R. Hosmer, George G. Ward, John W. Mackay, E. C. Platt, A. B. Chandler and William H. Baker are a majority of the directors of the company.

At a recent meeting of the stockholders of the Johnstown, Pa., Telephone Company the following persons were elected directors: George Kreuger, W. B. Lowman, Charles Griffith, P. S. Fisher, H. H. Weaver, James P. Thomas, Andrew Foster, Patrick McAneny and C. J. Mayer. The board reorganized last night for the year by the election of George Kreuger and C. J. Mayer, secretary and treasurer.

The fire department of Detroit, Mich., has adopted a telephone system to be used in connection with the fireboat and pipe lines. This will give direct connection with the boat from any hydrant, and is considered a great advantage over the electric bell system formerly in use. The telephone can also be attached to any fire-alarm box, giving communication with the signal office and enabling the officer in charge to send in a second alarm or order any apparatus he may desire.

The operations of the Mexican Telephone Company for the month of November and for nine months of the company's fiscal year to November 30, shows as follows:

Month of November:	1897.	1896.	Inc.
Gross	$10,877	$9,831	$1,046
Expenses	6,765	6,367	408
Net	$4,112	$3,564	$548
Since March 1:			
Gross	$95.573	$91,626	$3,947
Expenses	60,315	64,303	*3,988
Net	$35,258	$27,323	$7,935

*Decrease.

The number of the company's subscribers on November 30, 1897, was 2,477, or 189 more than at the beginning of the fiscal year.

ELECTRIC LIGHT FLASHES.

At the annual meeting of the Kings County Electric Light and Power Company, of Brooklyn, N. Y., the following officers and directors were elected: Felix Campbell, president; W. T. Williams, vice-president; E. F. Peck, secretary, and directors, Seth L. Keeney, William Berri, S. B. Dutcher, T. S. Williams, Hugh J. Grant, W. T. Wilson, Walter Ferguson, Charles Cooper, George E. Terry and E. F. Peck.

The assessment on the personal property of the Edison Electric Illuminating Company of Brooklyn, N. Y., was vacated last week by Justice Smith in the Supreme Court. Justice Smith said that if the assessors had deducted from the gross assets of the company the amount of capital invested in United States patent rights, as they ought to have done, there would have been no personal property to be assessed.

The Jamaica, L. I., Electric Light Company has made arrangements to enlarge its plant on Van Wyck avenue. The present building will be greatly enlarged, and four dynamos and eight new boilers will be put in at an expense of not less than $100,000. The company now have contracts for lighting the village of Jamaica, Woodhaven and all the rest of the town outside of Richmond Hill and Dunton for 10 years to come.

LITERARY.

"The Motor Engineer's and Electrical Workers' Handbook," by William Lintern, 150 pages, numerous diagrams, price, in morocco cover with pocket, $1; in cloth cover, 50 cents. This is a reference book in a simple and convenient form for the use of motormen and other electric railway employés. The book includes a number of diagrams showing controller connections and combinations which should be of considerable value in practical work. A number of simple methods of testing are disclosed, and the book bears the appearance of having been designed by a practical man for practical men.

"Elements of Electric Lighting, Including Electric Generation, Measurements, Storage and Distribution," by Philip Atkinson, A. M., Ph. D., has recently appeared in the ninth edition, fully revised, and with new matter added. The book is handsomely bound in cloth and consists of 279 pages with 104 illustrations. The text matter is brought fully up to date, and the work as it now stands forms a valuable treatise on the subjects covered in the title. The book will be sent postage free on receipt of its price, $1.50, by the Electrical Review Publishing Company, Times Building, New York city.

"The World Almanac and Encyclopedia for 1898" has been issued and is larger and more attractive than ever. In a great many business offices and homes the World Almanac has come to be regarded as the final authority in all disputes. The range of subjects it covers is wonderfully complete, and its information is always concise and exact. The almanac is now supplied in two bindings, paper and cloth. It is well worthy of a place in any library, and we would suggest to the readers of the ELECTRICAL REVIEW that if possible they should obtain it in the cloth binding so that it may be well preserved.

COMMENTS ON THE "ELECTRICAL REVIEW."

"AUTHORITATIVE AND WHOLESOME TECHNICAL JOURNALISM"

[*From the Inter-Ocean, Chicago.*]

The ELECTRICAL REVIEW has befittingly celebrated its fifteenth birthday with a becoming change in form and size. This paper is an admirable example of authoritative and wholesome technical journalism.

"GIVES THE EARLIEST AND BEST NEWS."

[*From the Inquirer, Philadelphia.*]

The ELECTRICAL REVIEW, 41 Park Row, New York, begins its sixteenth year in improved form and increased size and a large number of pages. The REVIEW gives the earliest and best news of electrical progress everywhere. An important article in the issue for January 5, is Mr. Tesla's article on vacuum tube lighting.

"MOST VERSATILE IN ITS SCOPE."

[*From the Press, Pittsburgh, Pa.*]

The ELECTRICAL REVIEW is one of the most reliable class papers in the country, as well as the most versatile in its scope of subjects relating to its branch discussed. In beginning its sixteenth year of publication it makes a change in its form and size, with a considerable increase in the number of pages. The paper will, as heretofore, give the earliest and best news of electrical progress and development of every sort.

"MORE BUSINESS-LIKE FORM."

[*From Telegraph Age, New York.*]

The ELECTRICAL REVIEW, of New York, made its appearance on January 5 in a new and more business-like form. The paper, after a successful career of fifteen years, measuring 16 by 11½ inches in size, now proposes to increase its success and popularity by reducing its dimensions to 13 by 10½ inches to meet the exacting demands of the times. The ELECTRICAL REVIEW will retain its popularity no matter what its size may be changed to. This reduction, however, certainly makes plainer the paper's appearance of substantiality, and we congratulate Mr. Chas. W. Price, its editor, and his able associates, on their past successes, and we hope the future has in store for them many brilliant achievements.

"BEST AND MOST READABLE ELECTRICAL JOURNAL."

[*From the Somersworth, N. H., Free Press.*]

The ELECTRICAL REVIEW, published at New York city, has recently made a change of form. It was good enough before the change, though an improvement is effected by the new form. The REVIEW is the best and most readable electrical journal in the country. It is interesting not only to those who are connected with electrical work, but also to all who desire to keep pace with modern thought on this important subject. No one of this age can afford to neglect the study or observation of electrical progress. Every intelligent citizen ought to seek the best information on this topic which is obtainable, and the best is always to be found in the REVIEW.

"NOTABLE AND IMPROVING CHANGES."

[*St. Louis Globe-Democrat.*]

Chief among the weekly periodicals devoted to scientific and electrical progress is the ELECTRICAL REVIEW, published in New York each Wednesday, and under the editorial supervision of Charles W. Price, with Stephen L. Coles, associate editor, and Stephen H. Goddard, advertising manager. There is no department of electrical science and application which is not adequately treated in the REVIEW. It is thoroughly up to date, and the latest discoveries in electricity and applications of this subtle force are promptly and intelligently set forth. The pages are profusely and graphically illustrated—by the half-tone process, when that is practicable. With the first issue of the current year some notable and improving changes in the form and size of the periodical have been made, making it more convenient and acceptable to the reader. The publishers assert that they have high aims and hope to make further improvements when practicable. One whose occupation or inclination leads him to take an interest in electrical matters will do well to add the ELECTRICAL REVIEW to his list of periodicals, if he is not already a reader of that publication.

Lamp Inspector's Indicating Wattmeter.

The successful operation of an incandescent lighting system depends largely upon the use of lamps of proper efficiency. To secure the most satisfactory service and highest economy, the efficiency of the lamps should be as high as the fluctuation of voltage on the circuits will permit. The selection of lamps for a particular installation should, therefore, be made with regard to the regulation obtained with the transformers in use. Efficiency is also the true basis for renewal of lamps, for it is manifestly uneconomical to continue a lamp in service when it has so deteriorated that the current it unnecessarily consumes costs more than a new lamp.

A portable instrument to determine accurately and rapidly the watts per candle-power required by a lamp is of great value in selecting new lamps and in testing lamps in service. The General Electric Company has recently designed and introduced the Thomson inclined coil, portable, indicating wattmeter to meet an increasing demand for instruments of this class.

All of the well known merits of the Thomson inclined coil instruments are embodied in the new wattmeter, and the workmanship is of the highest grade. The present design was adopted after numerous experiments to determine the most advantageous arrangement to facilitate rapid testing of lamps without inconvenience to their users. On account of the rapidity with which readings may be made, the indicating wattmeter will also be found invaluable for testing lamps in barrel lots, either with or without a photometer. The wattmeter will accurately indicate the energy used by small fan motors, and is therefore particularly useful in comparing, for a customer's benefit, the relative amount of energy required by a fan motor and an ordinary incandescent lamp. By supplying the secondary of a transformer with current, its core loss may be easily determined by the indicating wattmeter.

For rapid connection the wattmeter is supplied with two special plugs, an Edison, with Thomson-Houston adapter, and a Westinghouse, thus providing ready means for connection to the three forms of sockets most generally in use. The lamp to be tested is inserted in one of the receptacles in the base of the instrument and the proper plug placed in any convenient socket. Lead wires are provided, suitably tipped at one end for insertion in the plugs and at the other for connection to the binding posts of the instrument. A small secondary plug, arranged to fit the regular plugs, and provided with two small binding posts, is also supplied with every instrument. With this convenient device the power required by small motors or other apparatus may be conveniently measured.

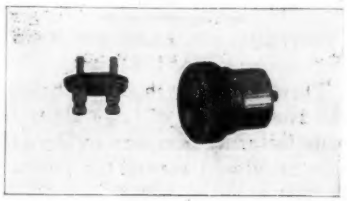

FIG. 2.—SECONDARY ATTACHING PLUG, THOMSON WATTMETER.

The capacity of the indicating wattmeter is 150 watts. Lamps of any candle-power up to 32 and of any voltage up to 150 may be tested, as may also any device the consumption of energy in which is not over 150 watts at any voltage not exceeding 150.

The fact that the instrument is equally well adapted for use on either direct or alternating currents necessitates the use of only one instrument in stations using both systems.

On direct-current circuits reverse readings should be taken to eliminate the possibility of any slight error which may be introduced in all instruments of this class by the presence of local fields. A special reversing button is provided to reverse the current in the instrument and lamp without permitting the needle to fall back to zero. The usual convenience of reversing lead terminals is eliminated by the reversing button. When reversed readings are taken the mean of the two is, of course, taken as the final reading.

Another advantageous feature of the instrument is the damping device. A button is provided which releases the needle or pointer from the damping brake *only* when depressed. When the button is released the needle is held at the point of the last indication; therefore, if the current is turned off and then on again, or reversed, the necessity of waiting for the pointer to swing from zero to a state of rest is avoided, and very rapid readings may be taken.

The terminals, reversing and damping buttons are mounted on a vulcanite baseboard, above which the graduated dial slightly projects. The instrument is mounted in a finely polished carrying case, with snap lock. It is light and compact, the external dimensions being 7⅜ inches by 7 inches by 4½ inches. All parts are finished in polished nickel-plate.

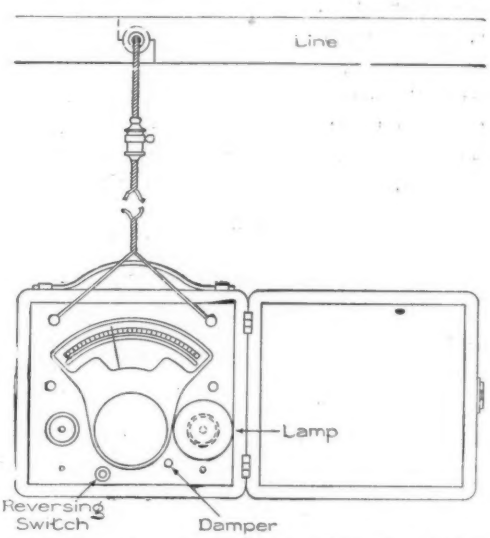

FIG. 3.—METHOD OF CONNECTING THOMSON INDICATING WATTMETER.

Telephone Apparatus Wanted.

Mr. John E. Hall, of Colchester, Ill., informs the ELECTRICAL REVIEW that he is figuring to install a telephone exchange at Colchester, and is in the market for the necessary apparatus. He desires manufacturers to send catalogues and quote prices.

The statement for December of the Edison Electric Illuminating Company of Brooklyn shows:

	1897.	1896.	Inc.
Gross	$93,657	$82,150	$11,497
Net	43,605	38,203	5,401
12 mos. gross	888,729	826,550	62,178
Net	370,098	342,148	27,949

Packing Export Goods.

A few weeks ago we drew attention to the fact that electrical firms in England do not know how to pack, and we were pleased to see that the English technical press took the matter up, says the *Review of the River Plate*. We have now another very flagrant case to report. We will, however, withhold the names of the shippers; but if this article should catch their eye, we hope that they will see the error of their ways, and, when adding large items to their bills for packing, will see that the goods are packed. The case in point is as follows: When at the works of the River Plate Light and Traction Company, we were very much struck with the marble switchboards that had arrived out of the United States in a perfect condition—without so much as a scratch. The manager informed us that they came splendidly packed, and at the same time stated that two marble switchboards which he had lately received from England for their Rosario and Tucuman stations came smashed to pieces, on account of the atrocious packing. We were shown a sample of American packing in several open cases, and we must confess that it was the best we had ever seen. The manager further told us that English firms have a lot to learn in the packing of arc lamps, as the American houses send them out so that no harm can possibly occur to them during the journey. There is only one point in which English houses beat the American, and that is in the packing of glass. The globes for the lamps that come from the States generally arrive broken, whilst those from England arrive with a smaller percentage of breakage. We hope that if Lord Salisbury's commission come out to these parts they will look thoroughly into this question of packing, as it is a very important one, and if not remedied will be the means of trade going to those countries where packing is given due attention.

The Metropolitan Street Railway Company, it was announced last Friday, had completed the lease of the Second avenue surface line in New York city. The Metropolitan interests some time ago secured control of the stock, and a few days ago notified the minority holders of stock that they would buy the rest of the stock at 150, the price at which the control was obtained. The lease is for a long period, on the basis of eight per cent for the first three years and nine per cent thereafter.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

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STEPHEN H. GODDARD, ADVERTISING MANAGER.

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Single Copies, - - - - - - - - - - .10
Copies can only be supplied for one year back at 25 cents each.

SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

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Has the gas engine finally come to stay in the electrical field?

The press of the country is constantly describing big electrical machinery, big electrical contracts and big electrical installations. This is a big country, and the extension of electricity's dominion throughout it is becoming more noticeable every day.

The usual attacks on telephone, electric light and electric railway companies now prevail in the various state legislatures. This is evidently an evil that will last as long as ignorant and narrow-minded legislators are elected.

The New York *Journal* suggests a plan to unite by rail New York, Brooklyn and Staten Island that is worthy of consideration. An electric street-car line is planned to cross a bridge from the Battery, at the lower end of New York, to Governor's Island, from there by bridge to a point directly opposite in Brooklyn, thence by rail to a tunnel from Fort Hamilton, under "The Narrows," to Staten Island. The idea is daring and perhaps ahead of any demand, yet is not impossible unless some serious obstacle should prevent the digging of this long tunnel under the deep waters of "The Narrows."

The State Department's consular reports are vastly improved. The intention to secure information, which will be of service to the public, and especially to merchants who desire to cultivate trade with foreign countries, is evident. January 1 the State Department began to issue daily bulletins, giving the reports as received. These are sent to the newspapers and others interested, and the information gathered abroad is thus put before the public promptly, avoiding the delay caused by the preparation of the monthly issues. The idea is an excellent one, and greatly appreciated by all who receive the reports.

NEW YORK THE GREAT POINT OF ELECTRICAL INTEREST.

The attention of the entire electrical manufacturing world of this country is concentrated on New York just now. The elevated road's oft-talked-of change from steam to electric power seems to be assured, and the lucky contractor or contractors will have to handle the most gigantic electrical undertaking in electrical history. The lowest estimate of the amount involved is $7,000,000. It is understood that four big companies are doing a great deal of close figuring on the proposition; namely, General Electric, Westinghouse, Walker and Sprague. The electrical and engineering talent employed in the anticipatory work is of the highest order, and includes names in many cities outside New York. We look for model electrical work in every detail throughout this great transportation system.

CONTROL OF ELECTRIC COMPANIES.

There are five men at the head of the same number of large electrical manufacturing companies who could together almost control the industry in this country. They are C. A. Coffin, of the General Electric; Geo. Westinghouse, of the Westinghouse; Anthony N. Brady, of the Walker; R. T. McDonald, of the Fort Wayne, and Chas. T. Yerkes, of the Siemens–Halske. If this idea should startle any of our interested electrical readers we would remark that such an alliance is very unlikely; and, besides, there are others, the Stanley which occupies a particularly fortunate and unique branch of the business largely its own, and the new comer, but an important one, the Sprague, with an independence and soon-to-be-shown strength that will be remarked in every state in the Union. Electrical development will, we predict, make greater strides in the last two years of the century than can even to-day be anticipated. And there is to be reckoned with a great deal of quiet but effective scientific and laboratory electrical work of which we have as yet only glimpses.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

The 121st meeting of the institute will be held at 12 West Thirty-first street, New York city, on Wednesday, January 26, 1898, at 8 o'clock P. M. At the suggestion of the executive committee the evening will be devoted to a discussion of the "Standardizing of Generators, Motors and Transformers."

It is proposed to discuss the question from the technical standpoint, in its relations to the designer, the manufacturer, the consulting engineer and the user. Consideration will also be given to the policy on the part of the institute in undertaking to bring about the result indicated in the foregoing title.

A meeting of western members for the discussion of the same subject will be held at the Armour Institute, Chicago, on the same date and hour, Wednesday, January 26, at 8 P. M.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The market has ruled, on the whole, rather quiet for the week, with occasional spells of strength and weakness. Twice or three times it has seemed as if Washington would provide one of its customary flurries, but each time that danger threatened powerful bull interests came to the rescue and prevented any serious decline. As a result of this the market is rather irregular. Some stocks, notably those of railroads in the far northwest, have been strong, while the Grangers and coal stocks have shown weakness. The speculation has not been very brisk, except in a few specialties. The week closes with a slightly heavy tone in the market, as a whole, due to the realization of profits in the case of stocks which have recently enjoyed speculative favor. Every one is inclined to conservatism on account of the possibility of unfavorable developments in connection with currency and foreign politics.

Definite news was expected during the week regarding the Manhattan electric contract, but so far nothing has transpired. At the conference of the directors of the company considerable dissatisfaction was expressed over the prices for electrical equipment and the situation with regard to the underground line. As far as prices are concerned, with three companies in the field a fair price will undoubtedly be obtained. A director of a leading electric corporation stated that the Manhattan company had fully decided to adopt the third-rail system. No confirmation of this could be obtained at the company's office. The Manhattan people seem inclined to go slowly, more especially as there is a good deal of politics in the matter. The general impression is that the contract will be divided among the principal large interests, but as regards the proportion and specifications there is nothing certain.

There has been little or no speculation in electric stocks during the week. The only exception has been North American, but the advance in this stock is to be regarded as merely a speculative movement without any particular bearing on the electric situation.

Edison Electric Illuminating of New York reported earnings for the month and year ending December 31, 1897. For the month, gross earnings aggregated $286,740, an increase of $40,465; net, $157,410, an increase of $24,291, and balance increased after depreciation charge, $24,249. Gross earnings for the year

increased $244,933; net increased $172,880, and balance available for dividends, after the payment of depreciation charges and accrued interest on bonds, increased $154,752. The earnings on the stock for the year were $798,230, or a little over 10 per cent on the stock outstanding.

A dividend of 3 per cent was declared on the preferred stock of the street railway and illuminating properties, payable February 1. Books closed January 21 and reopen February 1.

Quotations for electrical stocks on the New York Stock Exchange for the week follow: General Electric fluctuated within a range of two points, selling up to 36⅛, closing at 35; Western Union was steady between 90⅛ and 91½; North American on sales aggregating over 20,000 shares sold up to 5⅜, and closed the week 5 bid, offered at 5¼; American Telegraph and Cable at the close was bid 91, offered at 92; Edison of New York, 130 bid, 135 asked, and Edison Illuminating of Brooklyn, 105 bid, 108 asked; Edison Electric Illuminating of New York, 1st 5 per cent bonds sold at 117.

On the Boston Exchange, Bell Telephone opened at 269½, sold up to 272, and closed one-half point below the opening; Erie Telegraph and Telephone was steady around 71½ to 72; General Electric preferred ranged within a point to 90, and closed at 89, while New England Telephone was quiet and steady around 130, closing the week at 130 bid, 130½ asked.

On the Philadelphia Exchange, Electric Storage Battery stocks were comparatively steady, ranging between 26½ to 27 for the common, and 28½ to 29½ for the preferred. On transactions aggregating 40,000 shares, Pennsylvania Heat, Light and Power advanced 4½ points to 23¾, and was quoted at the close of the week 21½ bid, 23 asked. RAY.

Wall Street, January 22, 1898.

Patent Controlled by General Electric and Westinghouse Companies Sustained.

Judge Wheeler, of the United States Circuit Court of this district, handed down on Monday a decision sustaining the validity of the electric railway motor suspension patent controlled by the General Electric and Westinghouse companies, and ordering an injunction against the Union Railway Company, of New York, and the Walker Company, of Cleveland.

The Walker representatives in this city say the decision will not interfere with their railway work.

AN INTRIGUING PUBLISHER EXPOSED.

The slave of a magician saw his master wave his wand, and heard him give orders to the spirits, who arose at the summons. The slave stole the wand and waved it himself in the air; but he had not observed that his master used the left hand for that purpose. The spirits thus irregularly summoned tore the thief to pieces instead of obeying his orders.—Macaulay.

The controlling ambitions and fraternal impulses of the publisher of an electrical contemporary are strikingly portrayed in the following story of artful scheming.

It seems that a few months ago W. J. Johnston, publisher, outlined a policy for a young man newly in charge of the advertising department of the C & C Electric Company, of New York city. This policy gave the lion's share of the advertising to Johnston, and included a particularly interesting, shunt-wound method of "keying" the returns. The odds were so thoughtfully arranged as to be against different rival publications, in proportions ranging from about 10 to 1 to 100 to 1.

During the keying period, 13 advertisements appeared in Johnston's journal, containing a correct address of the C & C Electric Company, to wit: 141 Liberty street, New York. The building in which the company's offices are located includes the odd numbers from 139 to 145, inclusive. In none of the advertisements given by the advertising agent to the other electrical journals was the correct address used during the testing period.

In the ELECTRICAL REVIEW the address was "151 Liberty street," thus locating the offices of the C & C Company near the water end of a Hudson River pier. The total number of the advertisements in the ELECTRICAL REVIEW was two as against the 13 above mentioned. We deem it is a matter for congratulation that there were only two announcements in the ELECTRICAL REVIEW bearing this floating, will-o'-the-wisp address. Otherwise the harbor police patrol and volunteer life-saving corps would certainly have had to work overtime rescuing from watery graves seekers for this phantom office.

Why these deep, damp plans?

After three months of this so-called keying, Johnston sprung the climax on the guileless agent, and asked, the agent states, for a letter giving the result of this extremely fair test. The letter was written and proved very satisfactory to Johnston, as it included an unjust attack on other journals. He promptly distributed it in fac-simile, accompanied by an unsigned circular stating that the communication "came unsolicited." The circular also referred by name in a slurring, malevolent manner to rival publications, claiming that this test "showed the relative merits of the different electrical journals as advertising mediums," and stating "there is food for reflection in Mr. Scott's letter." This latter statement is undoubtedly true, and Johnston is just now cast for the leading "reflection" part in this highly entertaining comedy.

When the ELECTRICAL REVIEW proceeded to verify the genuineness and authority of this letter it was discovered that Mr. Stanley Dwight, president of the C & C Electric Company, was absolutely without knowledge of such a letter having been written. He at once directed the employé who signed the letter to apologize in person to the ELECTRICAL REVIEW and to the other electrical journals for his unauthorized action. This was done.

President Dwight, after a full investigation, wrote to the editor of the ELECTRICAL REVIEW and to the editors of the other journals reflected upon, stating that he greatly regretted the publication of the letter, that it was merely an expression of his employé's views, and that he had directed that all use of the letter cease. Mr. Dwight further stated that "the system of keying adopted was unreliable and, as a consequence, unfair to the other electrical papers," and that this statement was made with a view to correcting any misapprehension on the part of advertisers.

This emphatic repudiation was to be expected from a gentleman of Mr. Dwight's character and reputation for fairness. It was the proper course to pursue. The circumstances were admittedly aggravating and temporarily puzzling to an upright business man, who naturally scorns trickery.

We think it is time that all clean, honorable men in the electrical field should appreciate at their full value the character and propensities of a publisher who would so annoyingly embarrass and entangle a trustful patron for selfish and malicious ends.

This discloses the first chapter of an interesting story; before the word *finis* is written it is a safe prophesy that Johnston will realize, like Macaulay's slave, that he has filched the magician's wand with the wrong hand by the hot end.

PERSONAL.

The National Geographical Society, on January 21, held a meeting in honor of the late Gardiner G. Hubbard, who was president of the society at the time of his death. Prof. Alexander Graham Bell presided.

Mr. James Dredge, of London, one of the editors of *Engineering*, has been made a C. M. G. (companion of the order of St. Michael and St. George) in recognition of his services in connection with the recent Brussels exhibition.

Mr. Geo. E. Maltby, general superintendent of the Jamestown, N. Y., Street Railway Company, was a visitor to the metropolis last week. Major H. C. Evans, of the Johnson Company, and other friends, saw that Mr. Maltby received a proper welcome.

Mr. A. H. Pease, secretary and treasurer of the Hart & Hegeman Manufacturing Company, of Hartford, the extensive electric switch manufacturers, was a New York visitor last week. His company has New York headquarters at 203 Broadway, in charge of Wm. Taylor.

Mr. A. M. Patitz, the well known consulting engineer of Milwaukee, has found it decidedly profitable, having opened a Chicago office a while ago. He has already been retained on several important contracts let in that city, which indicates that it pays to be on the ground in order to get business.

Mr. Samuel Insull, president of the National Electric Light Association, passed through the city the first of the week on his return from Europe. Mr. Insull, after a hurried visit with New York friends, started for Chicago, where his important duties as president of the Chicago Edison Company are to be resumed after a brief absence.

A Co-operative City Electric Lighting Plant.*

The Gisholt Machine Company, of Madison, Wis., has made a proposition to the city of Madison regarding a co-operative electric light plant. This proposition is in refreshing contrast to the too common wire-pulling and underhanded methods pursued in such matters, and to give an idea of its tenor we quote from the proposition written by Mr. J. A. Johnson, president of the Gisholt company, as follows:

"Believing that municipalities should have a fair share of the profits of such public utilities as make use of the streets, and believing further that private enterprise can conduct these utilities more efficiently and more economically than is possible for the municipality, the Gisholt Machine Company desires to make a proposition for lighting the streets of the city by electricity, and for furnishing electricity for any other city purpose on the basis herein briefly outlined:

"The Gisholt company will install a suitable plant for the purpose, or have a separate company organized for it as it may think best, and will furnish the city with such amount of electricity for lighting and other purposes as the city may from time to time require, at a rate not exceeding that now being paid, and the amount of electricity required not being less. The company will keep a separate itemized and accurate account of the cost of the investment in the plant, and of all expenses connected therewith, and of maintaining the same and conducting the business, which shall at all times be open to the examination of the city authorities.

"After the actually invested capital, without any injection of so called 'water' or fictitious capital whatever, has received three per cent semi-annual dividends as interest or profits, the surplus earnings above the three per cent shall be equally divided between the city and the company. It must be understood that a reserve may be required for repairs, betterments and extensions, so that the surplus earnings above the three per cent will not always be immediately divided. But the shareholders will receive no greater benefit from this reserve than will the city. The proposition is to divide all net gains above the three per cent semi-annual dividends equally between the parties.

"The contract between the company and the city to continue 30 years. At the end of that time the whole plant to be sold to the best advantage, when it may be purchased either by the city, the company or any other party, unless an extension of the old contract or a new one is mutually agreed upon by the parties. The invested capital shall be refunded to the shareholders, and the overplus be divided equally between the city and the company.

"It is, of course, understood that the company will furnish electricity to other consumers, but the city will share in the profits on this business the same as on its own.

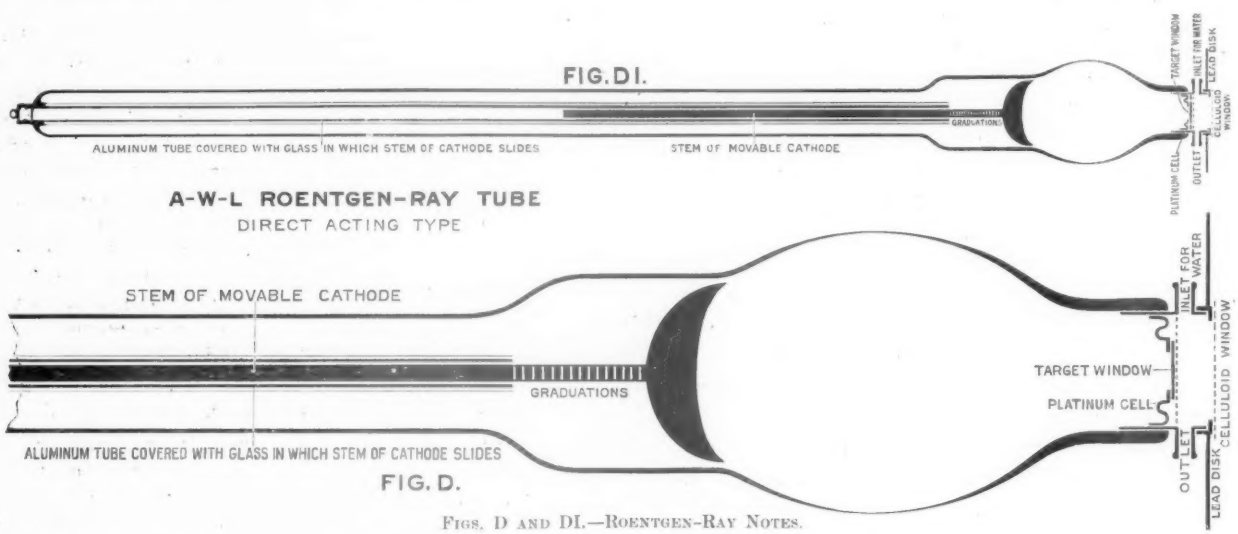
"That the best possible and most economical plant may be erected for the purpose, the company reserves the period of three years in which to install it and have it ready. It is, however, expected to have it ready within two years. The company believes that the cost of electricity will in the future be considerably reduced, and that the city should provide for receiving the benefit of a fair share of such reduction. The company believes that such reduction has been fairly provided for in this proposition.

"If, at any time, any dispute should arise between the city and the company, the matter in difference to be left to three arbitrators, one to be chosen by the city, one by the company, and the third to be selected by the two, and if they can not agree, the third to be selected by the judge of the Circuit Court. The decision of the arbitrators to be final.

"Should the company at any time either not earn the three per cent semi-annual dividend, or by reason of improvements or betterments its payment should be deferred, interest at six per cent, payable annually, to be paid on the amounts so deferred, which shall be taken out of the future profits."

So far as we are aware, this proposition is original in character. We hope it will be tried, and feel sure the outcome of the trial will be watched with considerable interest.

*From the *American Machinist*.



FIGS. D AND DI.—ROENTGEN-RAY NOTES.

Calling a Spade an Agricultural Implement.

[*From the Railroad Gazette.*]

In the description of the electric freight locomotive in your last issue, references are made to the "engineer's tool box." Does that mean that the future motorman, like the present locomotive driver, is to be miscalled an engineer? All the efforts on the part of railroad managers and others in this country to prevent enginemen from filching a title which does not belong to them have been unsuccessful so far. The "locomotive engineer" has come to stay—as long as the steam locomotive does. But there is a chance to correct the misnomer before he takes possession of the electric motor for good. Cable car men have been "gripmen" and trolleymen "motormen" without loss of credit, but the moment the motor appears on a "steam" road you begin to style its operator the "engineer."

And, by the way, you call the motor a "locomotive," which is just about as incorrect; but you do that because you had already misapplied the term "motor" and confined it to the rotative part of itself only.

What is greatly needed is a compact word that will express correctly what you have in what may be termed your "railroad mind," namely, a single derived power machine capable of moving a train of cars as a locomotive does, and as distinguished from another variety of the same machine which is intended for self-propulsion only. Neither of these machines would be a locomotive unless the electric current were to be generated within it, which might be done. The electrical engineers speak of single units and double units and multiple units, or what not, which are definitions that do not define, and are clumsy. What you really want is a simple term that can not be misunderstood, like "electric puller," for instance; "puller," for short.

These are small matters, many will say, but when we think of the millions and millions of repetitions, and the unnecessary explanations that would be saved by deporting these inaccuracies, they grow in importance.

The Citizens' Electric Light Company, with a capital of $20,000, has been organized at Downington, Pa.

ROENTGEN-RAY NOTES.

BY WILLIAM ROLLINS.

XVIII—THE WAVE LENGTH DEPENDS UPON THE VELOCITY OF THE IMPACTS UPON THE TARGET.

I have said the wave length depended upon the potential and the vacuum. It has been since stated that the wave length might possibly depend upon the vacuum, but it was difficult to see what the vacuum had to do with it. The proposition is therefore given in another form. The wave length of Roentgen light depends upon the velocity with which the cathode discharge strikes the target. The amount of light depends upon the amperage utilized at the target. From the foregoing, it is evident that the type of generator is of no moment for producing light of the proper wave lengths for medical use, except from a mechanical point of view, for we get sufficient electromotive force and amperage from any one, and we can produce the same effects upon the target either with the rapid discharges of a Tesla coil with a small condenser, or the slower discharges of an ordinary coil and a big condenser, or with a static machine having a sufficient number of 30-inch plates.

XIX—MOVABLE CATHODE TUBES.

Fig. C shows the tube mentioned in Note IV;* Figs. D and DI that described in Note IX.† The hole in the platinum is one-eighth of an inch in diameter. This is closed by a more transparent metal to allow the Roentgen light to pass. When we wish to get a very small radiant point without adjusting the cathode, a laterally movable diaphragm with a small hole is placed as shown by the dotted line, its opening being brought exactly opposite the place of impact of the cathode discharge on the transparent metal window target. To avoid risk of tearing the sealed-in platinum cell from the glass by the expansion and contraction of the window-target the form shown in the figure is adopted, the depression around the central area acting as a spring allowing this part to expand and contract without injury to the seal. When we use moderate potentials and vacuums the lead disk attached to the rim of the celluloid window cuts off all light from the tube except what comes through the opening in the diaphragm. We have, therefore, the best conditions for good definition—a small, radiant point and no secondary light source; on which points and on the use of light of a proper wave length we must depend for seeing details in the soft tissues of the human body. Since the cuts were made the cooling cell has been made in a separate piece and attached by a rubber tube, as this reduces the weight of platinum.

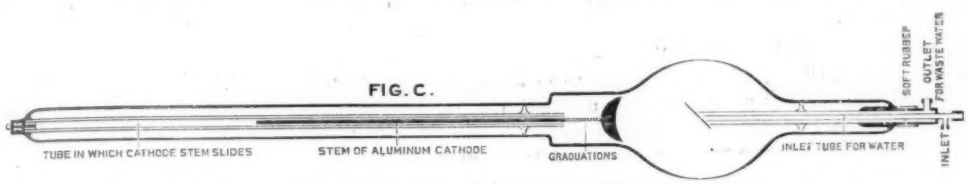


FIG. C.—A-W-L ROENTGEN-RAY TUBE WITH MOVABLE CATHODE.

XX—LOADING THE CATHODE GUN.

The cathode has already been compared to a rapid-firing gun, and an attempt has been made to show the importance of adjusting its range to produce the required effect upon the target. If we do not also consider the best means of loading, then the firing will be irregular and ineffective; therefore in this note I shall try to show how important it is to place the cathode gun in correct position for continuous loading. The experiments relate to a bulb-shaped vacuum-tube with two terminals. Fig. 5 shows a tube in which both gun and target, being movable, can be adjusted relatively to each other to insure a correct position, and, while maintaining this position, can be moved to different parts of the tube to find the best place for loading. If we place the cathode in the position shown in Fig. 5, we get the most light. If we place it as shown in Fig. 7, we get less light. If we place it as shown in Fig. 6, we shall find this the worst position of the three. In my early experiments to construct an efficient focus tube, after trying many forms, I concluded there was a critical position for the cathode, a little movement on either side of which distinctly diminished the amount of Roentgen light. Provided this observation is correct, what is the cause? Is it not the almost forgotten anode, which, since Roentgen's discovery, we have hardly considered, except to make it dense enough to stand the banging of the cathode discharge?

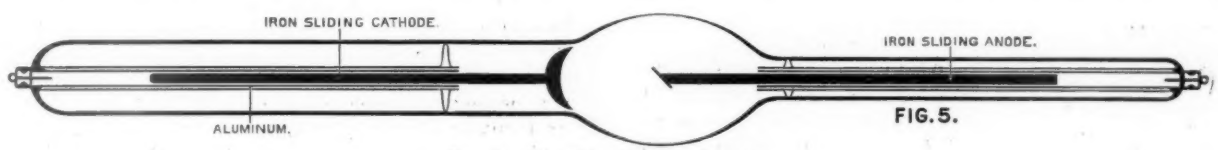
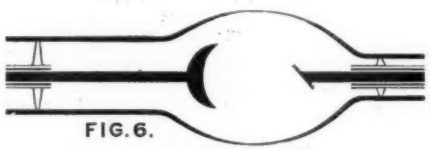
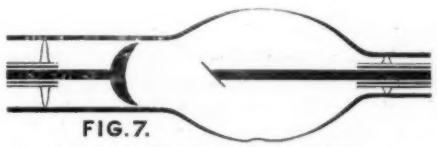


FIG. 5.—BEST POSITION FOR CATHODE.

Nineteen years ago Spottiswoode wrote "each terminal pours forth its electricity to satisfy its own needs and only to a secondary degree to satisfy the needs of the opposite terminal." Even if we do not admit this to be wholly true, we should not lose sight of the fact that in a vacuum tube with two terminals, molecules are being driven off from each, and when we wish to utilize those coming from the cathode to produce Roentgen light, we should be careful that those coming from the anode do not cause unnecessary collisions and retardations. If we study the rushing sweep of the molecules along the walls of the tube toward the cathode end, we can readily see that with the cathode in the position shown in Fig. 5 they will be delivered in good form to load the cathode gun, while with the cathode as shown in Fig. 6 they sweep behind it and must be brought forward before they can be used again. If the cathode is placed as shown in Fig. 7 they must, to a certain extent, interfere with the molecules which are rushing out of the mouth of the cathode gun on their way to the target. Dr. F. H. Williams working in connection with Frei, who was the best tube maker of that day, early discovered the importance of having the rim of the concave cathode disk almost touch the glass, and looking at these tubes by the light of later experiments I am inclined to attribute their efficiency to the cathode catching a sufficient number of molecules as they swept along. With powerful generators the walls of these tubes were sometimes broken by sparking between the cathode and the glass, and, it appears to me, that tubes made in accordance with the data I have since furnished are equally efficient and do not so readily spark, because the space between the periphery of the cathode and the walls of the tube is greater. The correct position for loading the cathode gun being given by the curvature of the walls of the tube as they approach the cathode. Perhaps it is hardly necessary to say that the tube shown in Fig. 5 and the one shown in Fig. D 1, Note 19, have no practical value; they were constructed simply for experimental work.



BAD POSITION FOR CATHODE



INCORRECT POSITION FOR CATHODE.

*See ELECTRICAL REVIEW, December 8, 1897, p. 272.
†See ELECTRICAL REVIEW, December 29, 1897, p. 310.

A Rapid Transit Problem.

[*From the Press, New York.*]

The Walker Company, of Cleveland, has just shipped to the Brooklyn Heights Street Railway the largest generator of electricity ever made for a trolley line. It is one of a pair and is 20 feet high, while the armature—the revolving part between the magnets—weighs 99,000 pounds. If a 99,000-pound armature will run one-half of the Brooklyn Heights line, how big an armature will it take to generate enough power to make the Manhattan "L" management move for rapid transit? Answers from Metropolitan managers barred.

NORTHWESTERN ELECTRICAL ASSOCIATION.

(Continued from page 52.)

THURSDAY AFTERNOON, JANUARY 20.

At 2.30 P. M. the convention was called to order by the president. A paper on "Electricity in Municipal Engineering," by Prof. R. B. Owens, of Nebraska, was then read for him, and a unanimous vote of thanks was extended to him.

An application for membership was then received from the Fort Atkinson Electric Light and Power Company, Fort Atkinson, Wis., and the applicant unanimously elected a member of the association.

A paper on the subject of "Municipal Socialism" was read by Mr. Fred De Land, of Illinois. Mr. De Land said in the course of the reading of his paper:

Mayor McVickar's official report showed that the cost of lighting in Topeka was only $48 a year, but a proper analysis showed that the actual cost was $93 per lamp, and that, too, without taking into account depreciation, which really should be included.

Mr. Norcross: I am quite sure that I speak the sentiment of every central station representative present when I say that of all the meetings I have attended of the Northwestern Electrical Association, I do not recall any in which I think the addresses presented have been so interesting, useful and practicable as those we have listened to at this session. I do not know whether our shrewd, sharp secretary and treasurer can accomplish it, but if in some way or other we could bring to this association every central station owner and manager it would be a most desirable consummation. I am certain that all who have not heard these valuable papers have lost a rare opportunity to improve themselves.

A unanimous vote of thanks was then extended to Mr. De Land for his paper.

President: If you all feel as I do now, I think that you realize that you have got more for your money in the last hour than you ever got for that amount of money in your life before, and any member of this convention that has not been in the hall during this talk does not know how much he has lost, and I would suggest for the benefit of the entertainment committee next year that when we go into session that we remain in session until we get through.

Mr. Bean: I move that we go into executive session. Motion seconded and carried.

The report of the Committee on Midsummer Meeting was then presented as follows:

We, the committee, most respectfully recommend to the members of the Northwestern Electrical Association that the association do not hold a Summer meeting in 1898.

W. Worth Bean. S. B. Silvermore.
E. L. Debell. C. C. Paige.
P. Norcross.

The report was accepted and the committee discharged.

Mr. Doherty: I move that a committee of five be appointed, and that this matter be referred to them with full power to act and that they be clothed with the full power of the association, a decision to be reached by April 1, 1898. Motion seconded and carried.

Mr. Doherty: I move that a vote of thanks be tendered to Mr. Hill for the remarkable work he has done in behalf of this association. Motion seconded and unanimously carried.

A motion was made that the president and secretary of this association be appointed to attend the next session of the National Electric Light Association at Chicago, Ill., to represent this association in that body. Seconded and unanimously carried.

Mr. Bean: As chairman of the Committee on Municipal Ownership, I wish to say that the government is getting out a report and the Hon. Carroll D. Wright, Commissioner of Labor, will put his sanction upon that report, and it depends upon every central station man whenever this blank is sent to him to fill it out. There is a different blank for municipalities. Remember that when the United States Government puts its stamp on this report that is the end of it.

President: This blank should be filled out as absolutely and completely as possible. The reports, of course, are made in absolute confidence.

An adjournment was here taken to 10 A. M., January 21, 1898, same place.

FRIDAY MORNING, JANUARY 21.

The convention was called to order at 10 A. M., President Copeland in the chair.

The president appointed as the committee referred to yesterday to consider the question of the midsummer meeting, Messrs. Norcross, Doherty, Dee, Korst and Hill.

The convention then adjourned *sine die*.

A Lamp Company Assigns.

The Bernstein Electric Company, of Boston, incandescent lamp manufacturer, has assigned to Benjamin F. Peach, Jr. The assignment is made for the benefit of creditors.

NORTHWESTERN ELECTRICAL ASSOCIATION CONVENTION NOTES.

Never since the first convention in 1893 has a more enjoyable, more harmonious nor more successful meeting been held than that which assembled at the Hotel Pfister on Wednesday, the 19th inst. Even the elements seemed to be favorably inclined to the occasion, for sunny skies and almost Spring-like air greeted the delegates and visitors as they arrived, 150 strong, from the surrounding states and farther points. A delegation of nearly sixty strong arrived from Chicago on the morning of the 19th, a special coach having been provided by the Chicago, Milwaukee & St. Paul Railway, over which the run was made with the road's proverbial smoothness and dispatch. Although the delegation found nearly all other members on hand, ready for business, quite a number arrived the following day, each expressing regret at not being able to come sooner.

In the social line, everything was done to make the visit as attractive as possible to all in attendance. Wednesday evening a number of theater parties were formed, and it is said that the several shows must have been unusually attractive, some of the participants not returning to the hotel till the early morning hours. The annual banquet on Thursday evening was, of course, *the* event, and over the wine and walnuts the selected toasts were ably and happily responded to, with a number of impromptu toasts not on the programme.

LIST OF ATTENDANTS.

E. H. Abadie, St. Louis,; Jas. Atkinson, M. B. Austin, Mrs. M B. Austin, M. B. Alexander, Chicago.

F. R. Bacon, Milwaukee; E. K. Batton, Chicago; W. Worth Bean and W. Worth Bean, Jr., St. Joe; C. L. Burlingham, F. B. Badt, Mrs. F. B. Badt, Chicago; F. N. Boyer, General Electric; L. W. Burch, Madison; B. L. Burdick, Milwaukee; C. W. Bacon, Madison; F. W. Buss, Chicago; W. P. Bragg, Monroe; C. E. Brown, Chicago; M. Brooks, Minneapolis.

Jas. Cloos, Chicago; H. O. Channon, Freeport; L. M. Cole, A. B. Conover, Geo. Cutter, Mrs. Geo. Cutter, Chicago; F. A. Copeland, La Crosse; A. G. Collins, Milwaukee; A. A. Cross, J. V. S. Church, Chicago; W. L. Church, Milwaukee; J. H. Callouck, Freeport; W. P. Clausen, Frank H. Clark, J. H. Culver, Chicago; W. P. Collins, Warsaw.

B. B. Downs, Fred De Land, Chicago; Thos. Duncan, E. R. Draffen, Ft. Wayne; E. L. De Bell, Sheboygan; G. A. Davis, Neenah; Alex. Dow, H. L. Doherty, Detroit; A. Donohue, Chicago; Jas. A. Dee, Houghton.

F. M Eberharnt, W. H. Edgar, Chicago; G. Ellis, Milwaukee; Axil Ekstrom, New York.

A. W. Foster, Thos. Ferris, Chicago; A O. Fox, Madison; H'y Floy, Chicago; F. H. Ford, Madison; E. A. Fox, Chicago.

Chas. B. Gage, Chas. Yirjahn, Thos. S. Grier, Ed R. Grier, Wm. Goltz, Chicago; H. J. Gille, St. Paul; T. T. Grover, Fond du Lac; D. C. Garrison, St. Louis; C. S. Guild, Chicago; C. P. Gilman, Milwaukee.

Geo. Hurd, F. S. Hunting, Milwaukee; L. A. Hine, S. H. Harding, B. Hartley, E. H. Hammond, J. M. Hill, Chicago; P. F. Harloff, Madison; Ad. Hamocek, Sturgeon Bay; H. C. Higgins, Marinette; Geo. W. Hamilton, Chicago.

Prof. Jackson, D. C. C., Madison.

F. S. Kurz, Appleton; J. M. Knox, Chicago.

C. S. Kehler, Milwaukee; C. E. Kammeyer, Chicago; Frank Kellogg, Spencer; A L. Kuchmstead, Chicago; H. R. King, Milwaukee; C. A. Kehler, Chicago; L. E. Kerns, Madison.

J. S. Loomis, H. E. Lang, W. W. Lowe, R. D. Lucas, A. M. Little, Chicago; A. C. Langstadt, Appleton; Otto Langstadt, La Crosse; S. B. Levennore, Winona; A. E. Lucas, Marion; C. E. Lukens, Chicago; I. P. Lord, Waupaca.

N. W. Mixer, J. H. McGill, J. B. McKeague, Chicago; J. S. Maurer, Fostoria; B. M. Meyers, Chicago; Thos. Mercein, Milwaukee; C. D. Marsh, New York; W. J. McConnell, J. B. Morrill, J. C. McMyun, A. M. McRay, Chicago.

F. D. Nims, Muskegon; Pliny Norcross, Janesville.

J. D. O'Hara, Chicago.

R. J. Parvin, Geo. Peck, J. C. Pomeroy, T. L Perry, Chicago; E. L. Powers, New York; G. W. Patterson, Chicago; H. A. Pierce, Nagaunee; F. A. Pamperin, Oshkosh; C. T. Page, Chicago.

F. Raymond, F. D. Ritchee, Chicago; J. E. Randall, St. Louis; W. S. Rugg, Chicago; Geo. F. Rohn, Milwaukee; Geo. P. Rex, I. D. H. Ralph, C. A. Ross, Jul. Roe, Chicago.

W. H. Schott, Chicago; A. C. Shaw, New York; B. J. Shockley, Geo. S. Searing, R. D. Schuchardt, Chicago; F. L. Stagg, Madison; R. A. Swain, W. R. C. Smith, C. M. Smith, Chicago; B. H. Strong, Barraboo; Ed Schutte, Manitowoc.

W. J. Trott, A. L. Tucker, Chicago; Geo. M. Thayer, Belle Plains; A. W. Thompson, Madison.

H. G. Underwood, W. P. Upham, Chicago; Ed Upham, Marshfield.

C. E. Van Bergen, Octonto.

Geo. S. White, J. M. Worrill, Jas. C. Wormley, W. Wadhams, Chicago; Ed Wuerster, Milwaukee; W. H. Whitesides, Chicago; F. F. Whitefield, Milwaukee; Jas. Wolfe, Chicago.

G. E. York, Portage.

EXHIBIT NOTES.

The large and convenient parlors and lobby of the Pfister Hotel offered unusual facilities for exhibiting to those who found it possible to make display. Probably the most interesting display was that of the Wagner company in Parlors 1, 2 and 3, where Messrs. E. H. Abadie, of the Wagner company, and D. C. Garrison, of the Columbia Incandescent Lamp Company, took excellent care of their respective companies' interests as well as of all visitors. A complete line of lamp samples showed the great variety now made by the Columbia people. The Wagner exhibit, besides a line of transformers, switches and cut-outs, comprised several of their latest type induction motors for single-phase currents. A motor was shown under current and operated perfectly; a number of interested visitors constantly crowding Parlor 3, where the tests were made.

In Parlor 4 the American Rheostat Company had a most complete exhibit, President Bacon and Secretary Hickcox doing the honors.

The exhibit consists of one one-half-horse-power, 110-volt automatic starter; one five-horse-power, 110-volt automatic starter; one seven and one-half-horse-power, 110-volt automatic starter, and the front of a 100-horse power, 110-volt automatic starter; one five-horse-power, 220-volt automatic speed controller; one 40-kilowatt, 110-volt rear of switchboard field rheostat; one three-kilowatt, 115-volt wall-type field rheostat; one 10-horse-power, 220-volt reversible elevator controller; one five-horse-power, 220-volt perfection starter; one front for a 20-horse-power, 220-volt perfection starter, and one controller for sewing-machine work.

The Cloos Electrical Engineering Company showed a complete line of the Cloos high-potential safety devices, junction boxes and switches, and Messrs. H. R. King, as well as the inventor, Mr. Jac. Cloos, were kept busy explaining the meritorious features of the devices.

The "Best on Earth" signs hung throughout the corridors referred to the Shelby & Wormley incandescent lamps, shown by Mr. James C. Wormley in Parlor 5. All voltages—all bases—any color—"Best on Earth."

Central Electric Company, while not having any exhibit, was nevertheless most prominently before the convention, Mr. W. P. Upham, in Parlor 6, having a phonograph in operation which not only gave visitors selections from the latest operas, but with great impartiality discoursed songs like "Sweet Rosie O'Grady," and repeated all the stories talked into it by several delegates the evening before. Secretary C. E. Brown, of the company, ran up from Chicago Thursday and shook hands with a host of friends and customers.

Messrs. Tucker, Wilkinson and Grier, of the Western Electric Company, were on hand and probably did not have very much time to themselves, as everybody had to shake hands and exchange a few pleasant words with the efficient exponents of that representative concern.

The People's Electric Company, of Madison, Wis., was on hand in Parlor 8, Messrs. Ford and Thompson being present. A number of attractive signs told of the many specialties successfully handled by this enterprising firm.

Northern Electrical Manufacturing Company, of Madison, showed two of its ironclad multipolar motors under current, one being exquisitely polished in all its parts, showing the high grade of steel and other material used in their construction. General manager A. O. Fox shook hands with a large number of delighted users and friends of the company's products.

Westinghouse Electric and Manufacturing Company, in Parlor 8, had in operation a constant-speed polyphase induction motor, the necessary transformers, switches and an alternating-current panel switchboard, demonstrating in a practical manner the high state of perfection to which this class of apparatus has been brought by the company.

Messrs. Fred S. Hunting, Thos. Duncan and E. R. Drapfen, of the Fort Wayne Electric Corporation, were conveniently located in Parlor 20, where a sample of each of the direct-current, 110 and 220-volt, as well as of the alternating enclosed arc lamps, were shown in operation. Two of the Duncan integrating wattmeters were also in circuit and were much admired on account of their accurate working and beautiful finish.

Manager C. L. Burlingham, of the McDermid Manufacturing Company, Chicago, was on hand, meeting old and new friends and explaining the company's latest specialty soon to be put on the market.

Geo. A. Hurd, of Crane company, Chicago, said he wouldn't miss an electric light or street railway convention for the best order of valves ever placed.

President Converse D. Marsh, of the Bryan-Marsh company, came all the way from the East to participate, and Col. J. M. Hill, of the Chicago office, ably assisted his chief's efforts.

Vitro-Chrome Chemical Company, of Milwaukee, showed a number of beautifully colored lamps, colored with vitro-chrome, which for clearness and light-transmitting qualities is said to surpass even the natural gas. It is not affected by the weather or changes in temperature, and costs less than one-third of colored glass. It seems to be far ahead of any of the several compounds heretofore used for coloring purposes.

Mr. B. M. Myers, representing the Fostoria Incandescent Lamp Company, was there, assisted by Mr. J. S. Maurer. If the appearance and get-up of the company's catalogue is any criterion from which to judge of its products in the lamp line, the latter must be perfection. A daintier, neater and more attractive booklet has perhaps never left the press, unless it was to preserve the writings of some great master in the arts or sciences. As an advertisement it may shoot wide of the mark on account of its elaborateness and artistic ensemble. The 52-volt, 16-candle-power cigars presented to all callers who smoked were fully up to voltage and of high efficiency.

The Dearborn Drug and Chemical Works, Chicago, was ably represented by its Milwaukee manager, Mr. Chas. S. Kehler, who, from his coigne of vantage at the head of the main stairway, allowed no one to pass without presenting him with a line of elegant souvenirs. The company's specialty is the preparation of boiler compounds, in which line it has met with remarkable success. The Dearborn Company does not depend upon one compound as a universal cure all for impure feed water, but first analyzes the water, makes a diagnosis of the case and then prepares the proper compound. The result is a cure in every case.

Electrical Appliance Company, Chicago, through its president, Mr. W. W. Low, and its secretary and treasurer, Mr. Thomas I. Stacey, Mr. Downs and others, was well brought to the attention of all delegates, even if no exhibit was on hand. If anything was lacking in the proper entertainment of the convention, it certainly was not due to any fault of this energetic and affable staff.

General Manager King and engineer Jac. Cloos, of the Cloos Electrical Engineer Company, were kept busy explaining in an entertaining manner the many good points of the Cloos high-potential safety devices.

Mr. Geo. W. Patterson, who represents American Circular Loom, Gordon-Burnham primary batteries, Medberry overhead material and other high-grade specialties, was in attendance and made many new friends, incidentally securing a good-sized order for batteries.

The Electric Storage Battery Company, in Parlor 56, had manager Frank H. Clark, of the Chicago office, explaining to all the merits of Chloride accumulators, and calling attention to the wide field of usefulness of the battery in general, especially when it comes to keeping down the "hump" of a load diagram.

Mr. Jas. G. Pomeroy, who was joined the second day by his senior partner, Mr. McGill, had no difficulty in convincing all delegates of the great merit inherent to all goods handled by this popular firm.

President Jas. F. Cummings, of Armorite fame, dropped in Thursday afternoon and must have felt much gratified over the enthusiastic reception tendered him by a host of friends.

Western manager Ed. R. Grier, of the Bryant Electric Company, made his first visit to one of the Northwestern conventions and was, of course, sorry he did not attend the former ones. C. E. K.

INDEPENDENT TELEPHONE MEETING AT INDIANAPOLIS.

REPRESENTATIVES FROM 35 INDIANA COMPANIES PRESENT.

The Indiana Mutual Telephone Association held its annual meeting at the Bates House, Indianapolis, Ind., on January 19. Representatives from 35 of the 42 companies holding membership in the association were present. The morning session was devoted to general discussion.

E. H. Andress, of Lafayette, said that the independent telephone business throughout the state was on the increase. George W. Beers, of the Home Telephone Company, of Fort Wayne, said that his company has 1,400 subscribers and charges a rental of $36 a year for telephones in business houses and $24 for those in residences. Where a subscriber has both, the rate is $48 a year for the two. He said the company has 700 miles of wire reaching other towns in Indiana and Ohio.

A committee was appointed at the last annual meeting to confer with similar committees of independent associations in Pennsylvania and Ohio. Their report showed that the independent enterprises were carried on in these three states named to a greater extent than in others. In the three states there are reported to be 250 independent exchanges, with more than 100,000 subscribers, and the capital invested is more than $5,000,000. The report said that the demand upon home companies is now for more extended or long-distance service. That this end might be reached it was stated that in the three states organizations are forming. To further this work, committees from the three states had been appointed. That from Indiana consists of E. H. Andress, George W. Beers and Hugh Daugherty.

The subject of obtaining an entrance into Indianapolis was a fruitful theme, and the discussion was crystallized in the adoption of a resolution that received unanimous approval. This resolution was as follows:

"Whereas, The independent telephone exchanges throughout the state of Indiana have no telephone connection with the city of Indianapolis, which fact retards the free business intercourse between the citizens of the towns of the state and the capital city, and

"Whereas, A large percentage of the business which ought to be carried on within the state is being sent to outside cities; and

"Whereas, The patrons of our several exchanges are very desirous of being placed in speaking communication with the business men of Indianapolis:

"Therefore, This association recommends that the citizens of Indianapolis take prompt action to install an independent telephone exchange in the said city and thereby secure for themselves their due portion of the trade and business of the state."

It was stated that at present there are no infringement suits pending against any of the members of the association.

The afternoon session was held behind closed doors. The following officers were elected for the ensuing year:

President, E. H. Andress, of Lafayette.

Vice-president, J. S. Stone, of Rushville.

Secretary and treasurer, A. E. Reynolds, of Crawfordsville.

Assistant secretary, W. H. Ernst, of Bluffton.

Executive committee, E. H. Andress, J. S. Stone, A. E. Reynolds, George W. Beers, of Fort Wayne; C. M. Zion, of Lebanon; Elbert Shirts, of Noblesville; A. E. Ramsey, of Crawfordsville.

A Giant Generator.

The Brooklyn Heights Railroad Company, of Brooklyn, N. Y., expects to receive about the middle of this week a giant generator, shipped a few days ago from the Walker Company's plant at Cleveland, Ohio.

The generator when assembled will be 16 feet high. It is the first of a pair being constructed by the Walker Company for the Brooklyn Heights Railroad Company. Four cars were required to move the generator. The armature is 7½ feet wide and 10½ feet in diameter. It weighs 99,000 pounds. The route to ship by had to be chosen, and the width and height of every cut, tunnel and bridge on the way ascertained.

THE RELATIONS BETWEEN THE CUSTOMER, CONSULTING ENGINEER AND THE ELECTRICAL MANUFACTURER.*

BY S. DANA GREENE.

(*Concluded from page 56.*)

In 1893 came the panic, and for the past four years there has been a wonderful record of savings and economies, both in electrical manufacturing and operating companies, as well as a great improvement in quality of product. It has been, in fact, the "economic and reconstruction period." The operating companies have learned that they, too, are manufacturers of a product—electricity; and, as these hard times have forced down the price of their product, they, like the manufacturers of apparatus, have had to keep their heads above water and their companies out of receivers' hands by the introduction of more economical and improved methods of manufacture and of administration. During the past year there has been a marked improvement in the electrical business. It is to be hoped that this improvement is permanent, and that the past four years of retrenchment and economy have paved the way for a normal and steady growth on conservative lines; in other words, for a period of "natural expansion." The business to-day is on much the same basis as in other industries, where prices are close, competition keen, and where a better article is furnished for less money than ever before.

The manufacturers of apparatus and the manufacturers of current are dependent upon each other to a large extent, and their relations should be close and friendly. The consulting engineer, as in other engineering trades, is a necessary and proper connecting link between the two, and I can say frankly that I believe he has a proper and permanent field of usefulness. Broadly speaking, his function is to see that his client who buys apparatus and installs it, selects first that system best suited to his particular local conditions, and then, in purchasing, secures the best (not necessarily the *most*) for his money. It is equally the duty of the consulting engineer to learn what the manufacturer can reasonably be called upon to make, to consult with him freely and to obtain the benefit of his experience; to give him credit for work well done and to insist that bad work shall be promptly corrected. Many consulting engineers, especially those who have recently commenced practice, seem to think that it is improper for them to consult with the manufacturer, or to examine his plant, or to ask him for information or advice. Their idea seems to be that, by so doing, they may be accused of partiality or undue bias, or with lack of proper care for the interests of the purchaser; or they may feel that it is derogatory to their own dignity as independent engineers. The inevitable result is that specifications often contain provisions which are a source of annoyance and expense to the manufacturer and purchaser alike, and which have no compensating advantages from either the engineering or commercial standpoint. In fact, some of these provisions are impossible or impracticable of fulfillment; and in such cases the honest manufacturer, who wishes to meet the specifications and guarantees required, finds himself forced to ask the engineer or the purchaser (sometimes both) to modify them. This is a proceeding which is always difficult and delicate to undertake and often results in friction and trouble for all concerned. I am satisfied that if every consulting engineer would take advantage of opportunities as they occur to visit manufacturing establishments, see the work there in progress and confer with the engineers, he would find himself well repaid for the visit, and his own work and practice benefited thereby. I am equally satisfied that no reputable manufacturing establishment would refuse admittance, but on the contrary would welcome such visits as beneficial to both parties. The day of mysterious methods of manufacture carried on behind closed doors is passed in the electrical business, and I appeal with confidence for an endorsement of the opinions just expressed to those consulting engineers who have already tried the plan suggested. I have said that I thought the engineer would find himself repaid by such visits. I think also that he will find himself in a better position to advise his client intelligently. A purchaser usually knows little or nothing of the relative technical merits of apparatus, and his final decision is governed largely by price and by paper statements and guarantees, which may mean much or little. The consulting engineer who has seen the apparatus in process of manufacture can advise not only as to whether the various bids comply with the specifications, but also what make or makes of apparatus are, from their design, construction and factory inspection and test, most likely to give the least trouble and expense in continuous service.

Some engineers seem to measure their value to the purchaser by the length of their specifications, and some of these formidable documents strike terror to the heart of a busy man confronted by a deskful of mail. The specifications not only specify what the conditions of service are, what apparatus is required and what tests shall be applied to it for acceptance, all of which are quite proper; but also *how it shall be built*, which is another matter. The electrical manufacturers of this country, following the admirable precedent which has given American manufactured products (particularly machinery) a world-wide reputation, have endeavored to establish *standard* lines of apparatus, whenever the permanency of type and the size of the demand warrant it. This practice not only tends to reduce cost (and with it price), but also enables the purchaser to secure quickly and at a minimum of expense, duplicate parts which are really duplicates and which can be fitted without the aid of a skilled mechanic. It is the American system of standard lines of machinery and interchangeability of parts, which has stood the test of time and which holds its own against all competitors. This system, however, is possible only where the same article is manufactured in quantity, since the expense of designs, drawings and patterns, special tools, jigs, dies, etc., is prohibitive, unless spread over a large production. On the other hand, if special apparatus is required, it means a relatively large expense for these items which can not be charged to a standard product, and which thus constitute a handicap both to the manufacturer and the purchaser. A machine is "standardized" only after long experience, both in manufacture and service, and other manufacturers (the builders of engines, trucks, etc.), as well as the *users*, are invariably consulted before such standardization. It would appear to be to the interest of both seller and buyer to use such standard machines wherever and whenever possible; and yet it seems to be a fact that the demand for special machines is increasing, rather than decreasing, as apparatus becomes more generally standardized. To prove this I can cite the experience for the past year of one manufacturing company with which I am familiar. During this period the designing engineers were called upon for estimates on *special apparatus*, as follows:

Direct current:
No. of estimates, 300.
No. of kw. of app. involved, 31,000.
Alternating current:
No. of estimates, 300.
No. of kw. of app. involved, 131,200.

These estimates were all embodied in formal propositions; besides, there were between two and three times as many preliminary estimates required to answer inquiries of customers, which the engineers had to prepare. This was in addition to their regular work on standard lines of apparatus, of which there are over 30. Some of this work was undoubtedly due to new developments in the business and to new methods and inventions, a condition which, although unfortunate from the manufacturing standpoint, must exist for many years to come; but a great deal of it was also due to the fact that specifications call for special apparatus, or methods of construction, where standard apparatus and methods would do equally well. This experience I find is common among electrical manufacturers, and I attribute it largely to lack of touch between the manufacturer and the engineer drawing the specifications, whether he be regularly employed by the purchaser, or retained in an advisory capacity. Let the engineer see more of the manufacturer and his work and let him hold the latter responsible for results, as determined by proper tests, leaving the details of construction where they belong, in the manufacturer's hands.

This brings us to another phase of the subject; viz., the tests and guarantees prescribed by specifications. Omitting from consideration matters which, as already stated, belong properly to the designer and builder, such as current densities in the windings or in brushes, methods of insulation, kinds of material, etc., the tests necessary to determine a machine's quality (and hence its value to the purchaser) are few in number and can be enumerated under the headings of *efficiency*, *heating*, *regulation*, *sparking* and *insulation*. If the requirements under these five headings were formulated under some general rules, and if the methods of tests to determine results were uniform, the work of the consulting engineer and the manufacturer would be vastly lessened. Such, unfortunately, is not the case, and specifications on these points vary widely both as to requirement and as to the method of test. It seems practically impossible for the various manufacturers and consulting engineers to standardize these requirements and tests by any concerted action, and the only other solution of the difficulty is for some scientific, non-partisan organization to undertake the work. The American Institute of Electrical Engineers is just such a body, and it would render a great service to the entire electrical business if it would consider the matter. Without attempting in any way to suggest what action it should take, it seems proper to call attention to some of the points which most frequently give rise to misunderstandings and disputes.

1. Efficiency—The proper distinction between electrical and commercial efficiency is not made. The latter is what interests the purchaser and it should always be specified. A clear statement of what losses must be included to determine it, and also a general statement of what constitutes reasonable and proper commercial efficiencies in well designed machines would be of great service. Such a statement should show the necessary difference between carbon and copper brushes, and between the voltages most commonly used in direct-current work; viz., 125, 250 and 500 volts, as well as between machines of various sizes. The formulation of such information on alternators is more difficult, but all manufacturers have certain standard lines of these machines

*Read before the New York Electrical Society, January 12, 1898.

and it is quite possible to make some intelligent, general rules.

Electrical manufacturers are sometimes required to guarantee the *combined* efficiency of generator and engine or other prime mover. This is clearly unfair and shifts the direct responsibility of guarantee from the maker of the prime mover, where it properly belongs.

2. Heating—For all ordinary conditions of service, the safe heating limits for continuous full-load operations can be determined with a fair degree of accuracy. The commutator heats more than any other part of the machine, particularly with carbon brushes, a fact which is often ignored. Sometimes the heating is measured by thermometer, sometimes by increase in resistance. There should be one uniform method followed. Overload guarantees (ranging from 25 per cent to 100 per cent) are sometimes required for a period within which the ultimate temperature of the machine is reached, and the necessary capacity of the machine is thus increased as certainly as though a larger machine were specified. It would seem that the time duration of overload tests should bear some relation to service conditions. If the service requires a 50 per cent overload for eight hours or more, a larger machine is evidently necessary.

3. Regulation—Specifications frequently call for a straight-line compounding curve, a condition which is practically impossible until we discover a magnetic material which has a straight-line saturation curve. Another common requirement in the case of lighting generators, is that a drop of say two per cent in speed shall not affect the electromotive force more than two volts, which is also an impossible condition, even with a separately excited generator. A reasonable margin in either case, having due regard to the service for which the generator is intended, should always be allowed.

4. Sparking—Modern design, and the use of carbon brushes, have greatly reduced the trouble from sparking, but machines are sometimes called upon to stand excessive overloads without sparking, which can be accomplished only by using a larger machine or by a distortion of design, which is bad practice. Any good machine, with carbon brushes, should be able to stand a variation from no load to full load without movement of brushes and without noticeable sparking; it should also stand a reasonable overload, say 25 per cent, without injurious sparking.

5. Insulation—This is a cause of frequent trouble and annoyance. The common practice is to specify an insulation resistance of so many megohms, regardless of the size of the machine and the voltage and conditions of service. Considering the fact that this resistance varies inversely as the area of surface to be insulated, and considering the enormous variations in size, shape, voltage and service requirements of different machines, it is evident that such a test is impracticable, and means little or nothing. Insulation resistance is largely a question of dryness, and if an armature be baked for a sufficient length of time, almost any resistance within reason can be obtained. I have known a large 400-kilowatt lighting armature to measure a megohm resistance, as required by specifications, after several days' baking (which, by the way, permanently injures the structural strength of the insulating material), and yet it showed practically no resistance when it reached its destination, because it had been in the rain and dampness for a week or more, and the large surface naturally afforded an excellent lodging place for moisture. A day's run in a weak field, with the armature short circuited, quickly brought the insulation up again.

The only proper way to insure good insulation, with reference both to the material used and the method of construction employed, is by a *high-potential* test, applied when the machine is reasonably dry. This test should be intelligently gauged by the voltage of the machine and the service required. Thus a high-potential test of 1,000 volts is ample to detect any insulation weakness in a 125-volt lighting generator, while a 5,000-volt test is ample for a 1,000-volt alternator, allowing proper factor of safety in each case. Recent careful investigations have developed the fact that the only correct way in which to determine the proper high-potential test for any given machine is to consider jointly the time duration of test, the current frequency and the voltage of machine. As the latter rises, the margin between it and the test voltage necessarily decreases, on account of the liability to permanent injury of the insulation when subjected to excessive voltages. Because 5,000 volts is found to be a proper test voltage for a 1,000-volt machine, it by no means follows that 50,000 volts is proper for a 10,000-volt machine, or that the apparent factor of safety should be the same as the voltage rises. There should be a careful formulation of proper high-potential tests for different classes of apparatus, based upon scientific investigation and tests, and it is believed that it would not be a matter of any great difficulty to formulate such a schedule.

It is earnestly to be hoped that the institute will consider that these questions come properly within its sphere of action, and that it will take action in a matter of so much moment to all concerned. It should be remembered that where special conditions are imposed, which lead to distortion of design, or to the manufacture of special apparatus, the purchaser, no less than the manufacturer, is bound to suffer, and it is the purchaser who pays the bills, directly or indirectly. If the purchaser finds himself involved in unexpected expenditures, the consulting engineer, too, comes in for his share of blame and dissatisfaction.

We come finally to the commercial requirements which have gradually found their way into specifications, and which are sometimes onerous and unfair. Perhaps the most important of these is the question of shipments. It is not uncommon for shipment to be specified by a certain date, under a forfeiture of so many dollars a day for each day's delay thereafter, and the award of the contract is often largely affected by such promises. The manufacturer starts the work in his shops, and if the time is short he is apt to work overtime. About the time the apparatus is ready for shipment, and without any previous warning, word comes to withhold shipment because the purchaser is not ready to receive it. There were recently fifteen carloads of apparatus lying in the yards of one of our manufacturing establishments, besides a number of large machines stored in the shipping and testing departments, which had been made on time contracts and held at the last moment by request of the customer. It is difficult for one not in this end of the business to realize the resulting demoralization throughout the shops, and it is a condition which could easily be remedied by the exercise of more foresight on the part of the purchaser and his engineer. In all cases where a penalty for delay in shipment is imposed, it is fair and reasonable to ask that a similar bonus should be awarded if shipment is made in advance of the promised date, or if the purchaser is unable, through no fault of the manufacturer, to receive the apparatus on that date. It is sometimes required that the consulting engineer shall have free access to the shops at all times while the apparatus is in production. Such permission is impracticable if proper shop administration and discipline are maintained, and these visits should be made at certain specified stages of the work. It is, of course, always proper for an engineer to be present when the apparatus is finally tested.

A clause is commonly found in specifications providing that the consulting engineer shall be sole judge of the true intent and meaning of the specifications; and in case of any dispute thereunder his decision shall be final and binding. It is true that this clause is common in architects' and builders' contracts, but it is doubtful whether it could be enforced at law in case of a dispute as to facts, and it certainly seems fair that in case of such a dispute, where the two parties honestly disagree, provision should be made for a third disinterested party to act as arbiter.

While there are many contracts executed which involve one or more of the provisions (technical or commercial) mentioned above as liable to cause trouble, and where no trouble is experienced, due to the common sense and good judgment of both engineer and manufacturer, still the cases where trouble does arise are not frequent, and the best specification is one so fair and so clear that no dispute or misunderstanding can arise, except with malicious intent, and which requires no arbiter to interpret its true intent and meaning.

In conclusion let us hope that the customer, the consulting engineer and the manufacturer will, in the future, consult each other more freely and frankly by personal interview or by correspondence; and that all of them will unite in endorsing any intelligent attempt to standardize such tests and technical requirements of electrical apparatus as are matters of common usage in our daily business intercourse.

Motor-Driven Printing Presses.*

As was to have been expected, printers have not been the last to avail themselves of the advantages which recent discoveries by the students of electric science have placed at the disposition of industrial enterprise.

The advantage is obvious of a system which renders it possible to locate presses and other printing machinery in any part of an establishment, exclusive of line shafting, and also to run any one press at any time independent of the others. With presses equipped with direct-connected motors, each can be run at any hour of the day or night, with an expense of power proportionate to the work done, instead of that requisite for running a boiler, engine and heavy friction load of shafting and belting.

What such a saving amounts to may be judged by an estimate made by Professor Benjamin, of the Case School of Applied Science, of Cleveland, Ohio. In 16 establishments whose plants Professor Benjamin tested, there was developed 1,808 horse-power, and of this 979 horse-power, or 51 per cent, was expended in driving the shafts, pulleys and countershafts, while all the machines were idle. There are cases on record in which the loss of power in transmission from engines to machines, through belts, is much higher even than this, ranging from 80 to 93 per cent of the total power generated.

So direct an appeal to economy as is made by such facts as these has a strong tendency to increase the already rapid process of installation of electric power plants.

Another great advantage of direct-connected motor to the press or other machine is that an accident to the power does not affect the whole plant, as the breaking of a belt or the main shaft causes a complete shut-down until repaired. And this by no means infrequent occurrence very often assumes the proportions of a real catastrophe.

*From the *Inland Printer*.

ADVANCE INFORMATION

Electric Light and Power.

CARTERVILLE, ILL.—Colp, Arnold & Company has been incorporated by John Colp, H. F. Arnold, Monroe Colp and U. L. Walker, to operate electric light plant, etc.; capital stock, $25,000.

LOS ANGELES, CAL.—Electric Water Company has been incorporated by Wm. S. Porter, J. W. McKinley, Wm. A. Kolman, N. W. Bell, M. L. Groff; capital stock, $500,000.

BRECKENRIDGE, MINN.—An electric light plant has been established.

HUDSON, WIS.—The Interior electric light plant, owned by Christian Burkhardt, has been leased to Christian Wangegard.

CENTERVILLE, MICH.—Centerville Water and Electric Company has been incorporated, with a capital stock of $10,000.

ANNAPOLIS, MD.—The Annapolis Electric Light Company, having closed up Spa Creek by placing its wires, leading to Eastport, over head on the draw of the bridge, Capt. George Ward, of the "Lillie May," of Annapolis, opened this tributary of the Severn again to navigation by driving under full sheet through the obstruction.

HAWKINSVILLE, ALA. — L. C. Ryan can give information concerning the establishment of an electric light plant.

KNOXVILLE, TENN.—The Knoxville Electric Light and Power Company have filed mortgages for $100,000. The money will be used for extensive improvements.

FERNANDINA, FLA.—Work has commenced on the electric light plant.

STUTTGART, ARK. — Steps are being taken to establish an electric light plant.

UTICA, N. Y.—C. A. Nott & Company, proprietors of the Butterfield, are about to close contracts for an electric light plant for their establishment. The plant will have a capacity of 500 sixteen-candle power lights. The dining-room and lobby will be lighted with arc lamps.

ALBANY, N. Y. — The Citizens' Electric Light Company has been incorporated. The capital stock is $20,000. President of the board of directors, Theodore Shockney; secretary and treasurer, Joseph T. Gist; general manager, Charles M. Reed.

WALKERTON, IND.—The question of electric lights for this place is being agitated.

HIGHTSTOWN, N. J.—Hightstown Electric Light and Power Company has been incorporated. The incorporators are Francis C. Thorn, Delanco; Charles P. Fitch, Beverly, and Theodore Mostard of Philadelphia. The capital stock is $25,000. The intention of the company is to erect a plant at Hightstown and supply that and other nearby places with light, heat and power.

SHERIDAN, IND.—The contract has been let for a complete electric lighting system for this town. The power-house is already under construction.

LOS ANGELES, CAL.—The East Side Lighting Company, with a capital stock of $100,000, has been incorporated. The purpose of the corporation is to supply the county with electricity for lighting, heating and power purposes. The following directors were named: William A. Wills, J. A. Winnans, W. J. Washburn, Charles E. Carver and S. A. W. Carver.

LOS ANGELES, CAL.—The Azusa Electric Lighting and Power Company, with a capital stock of $5,000, has been incorporated.

HARRISBURG, PA.—The Monongahela Valley Electric Company has been chartered for the purpose of furnishing electric light, heat and power for the borough of Speers, Washington County. The company is capitalized at $1,000, and the directors are Robert T. Rossell, W. B. Carson and George B. Motheral.

JERSEY SHORE, PA.—The Jersey Shore Electric Company has been incorporated; capital, $30,000.

New Telephone and Telegraph Companies.

NEW ORLEANS, LA.—The People's Telephone Company has been incorporated, with George N. Morton, president; William P. Curtis, vice-president, to operate telephone systems, etc.; capital stock, $600,000.

MOAB, UTAH—A telephone line is to be constructed between Thompson's Springs and Moab.

EVANSTON, WYO.—The Unita-Rich Telephone Company has been incorporated, with a capital stock of $5,000.

BETHANIA, N. C.—The telephone line to Bethania is to be extended to Rural Hall.

ST. JOHNS, MICH.—The National Telephone Company has been incorporated, with a capital stock of $10,000.

FORT SMITH, ARK.—The Arkansas Telephone Company's plant has been sold at public auction.

PLYMOUTH, N. C.—The Washington County Telephone Company has been incorporated by W. H. Ward, B. O. Crinkley, G. W. Roper, E. S. Chesson, T. J. Basnight and J. F. Belange, to build and operate a telephone line from Plymouth to Creswell and intermediate points.

ROMENEY, W. VA.—A company has been organized to build a telephone line to Cumberland. A. B. C. Whitacre, president and general manager; E. V. Parker, secretary and treasurer, and John J. Cornwell, attorney.

PACKWOOD, IOWA—An effort is being made to establish a telephone line from here to Fairfield.

CORPUS CHRISTI, TEX.—A new telephone line is to be established.

New Electric Railways.

MONROE, MICH.—Holt, Schober & Company, of Philadelphia, have the contract to build the Jacobson & Johnson electric railroad from Toledo to Monroe, and from Monroe to the lake. Work will commence immediately.

TROY, N. Y.—The Troy City Railway Company has organized by electing the following officers: President, Charles Cleminshaw; first vice-president, Anthony N. Brady; second vice-president, Francis N. Mann, Jr.; secretary and treasurer, J. J. Hagen.

DALLAS, TEX.—C. H. Alexander has purchased from George W. Davenport, of Middlesex, Mass., the entire property of the Queen City Electric Street Railway in this city. The system embraces the Elm, Pearl, Bryan and Live Oak street lines.

ALBANY, N. Y.—The Delaware Valley Railway Company has been incorporated by Henry Davie, J. R. Honeywell, Samuel P. Wilbur, George W. Youmans, James F. Scott, W. C. Oliver, and others, to construct and operate an electric road from Delhi to Andes and Bovine Centre; capital stock, $150,000.

Increase of Capital.

HUNTSVILLE, TEX.—The Huntsville Electric Light and Ice Company has increased its capital stock from $6,500 to $9,000.

New Incorporations.

COLUMBUS, OHIO—The Electroline Manufacturing Company, of Cleveland, has been incorporated, with $15,000 capital stock. The company is to engage in the manufacture of electroline and for the purpose of selling the same, together with gasoline and other oils. J. C. Meader, John E. Day, John J. Greenway, W. C. Clark and Francis L. Greenway are the incorporators of the company.

DETROIT, MICH.—The Harris Still Alarm Company has been incorporated. The capital stock is $50,000. Following are the incorporators: John S. Allam, Detroit, 2,124 shares; John S. Allam, trustee, 2,874; Franz C. Kuhn, 1; George C. Morse, 1 share.

MEMPHIS, TENN.—The American Dynamo-Engine and Motor Lamp Company has been incorporated by C. C. Cowan, Jere Horne, M. L. Whitfield, John E. Bell and J. S. Williams, to manufacture and sell dynamo-engines and electrical appliances, motor engines and lamps; capital stock, $150,000.

NASHVILLE, TENN.—The Braid Electric Company has been incorporated by J. W. Braid, W. W. Gambill, Thomas Jones, E. C. Andrews and M. C. Woolwine, to deal in electrical machinery.

John Wanamaker on Advertising.

[*From the Wool and Cotton Reporter.*]

"I never in my life used such a thing as a poster or a dodger or a hand-bill," said John Wanamaker. "My plan for 20 years has been to buy so much space in a newspaper and fill it up as I wanted. I would not give an advertisement in a newspaper of 500 circulation for 5,000 dodgers or posters. If I wanted to sell cheap jewelry or run a gambling scheme, I might use posters; but I would not insult a decent reading public with hand-bills. The class of people who read them are too poor to look to to support mercantile affairs. I deal directly with the publisher. I say to him:

"'How long will you let me run a column of matter through your paper for $100 or $500?' as the case may be. I let him do the figuring, and if I think he is not trying to take more than his share I give him the copy. I lay aside the profits on a particular line of goods for advertising purposes.

"At first I laid aside $3,000. Last year I laid aside and spent $40,000. I have done better this year, and shall increase the sum as the profits warrant it. I owe my success to newspapers, and to them I freely give a certain profit of my yearly business."

Kindred.... ...Interests

The Connecticut Telephone and Electric Company, of Meriden, Ct., is sending out a neat and attractive desk calendar embellished with an artistic engraving.

William Roche, of 259 Greenwich street, New York city, is manufacturing a miniature size of his new Standard dry battery. The battery is so constructed that it can be carried in a pocket, and is made powerful enough to light a miniature lamp.

Hart Flush Switches, made by the Hart & Hegeman Manufacturing Company, of Hartford, Ct., are described in a new catalogue which may be had on application. The line embraces standard and flush switches, special switches, gang plates and gang switches, as well as wiring diagrams.

John A. Roebling's Sons Company, 117 Liberty street, New York city, have issued an interesting pamphlet on Climax resistance wire which has nearly fifty times the resistance of copper, while German silver has only 18 times, and ordinary steel wire about eight times the resistance of copper wire of the same diameter.

The Brunt Regulating Socket for regulating the candle-power of incandescent lamps, now being introduced by the Central Electric Company, of Chicago, is represented by them to be meeting with a very ready sale. These goods have forced their way to the front as among the best articles of the kind yet produced for regulating the candle-power of incandescent lamps.

The Upton Midget long-burning arc lamp is already a very popular specialty. The small size, light weight and tasty appearance of the lamp make it a very desirable arc lamp for inside work, while its positive and steady action and general reliability make it a popular lamp for all places where a long-burning arc lamp is required. The Electric Appliance Company, Chicago, will be glad to send their latest circular on this specialty on application.

The Cutter Electrical and Manufacturing Company, of Philadelphia, have just issued a new catalogue and price list of their well known I-T-E circuit-breakers, embodying all the latest types—single-pole, double-pole, double-pole double-coil, and triple-pole instruments being listed. This will be sent upon receipt of request, either from their office, 120 Liberty street, New York, or from 1112 Sansom street, Philadelphia.

The Newton Appliance Company, of 120 Liberty street, New York, are introducing a new automatic door switch for telephone booths, etc. The switch, when the door is opened, automatically lights an incandescent lamp, which is disconnected when the door is again opened. The company report several large orders for the new switch from the different telephone companies and claim that it will prove to be a very useful appliance

The General Electric Company is preparing plans for one of the largest iron foundries ever constructed in this country, to be built at Schenectady, N. Y. It will be 500 feet long and 130 wide. The officials of the company also announce that they are considering the advisability of removing the lamp works at Harrison, N. J., to Schenectady. The Harrison works now employ about 1,200 hands, but if removed the plant will be enlarged and the force increased to 1,800.

A serviceable calendar has been issued by the General Electric Company from its own printing office at Schenectady, N. Y. At the head of the calendar is a well executed bird's-eye view of the company's extensive plant at Schenectady. The printing is in colors and gold and the designs are artistic. The calendar pad consists of a separate sheet for each week and under each date are the hours for lighting and extinguishing street lamps, arranged according to a moonlight schedule, good for all central stations between latitudes 40 degrees and 45 degrees.

TO CONTRACTORS—Sealed proposals for furnishing the materials and performing the labor required and necessary for the electric wiring and fixtures for Cottages Nos. 4, 5 and 6, of Group "D," at Central Islip, N. Y., and for furnishing the materials and performing the labor required and necessary for the consolidation of the electric lighting plants at the New Power House at Ward's Island, N. Y., for the Manhattan State Hospital, may be sent by mail or delivered in person up to 4:30 P.M., on the 3d day of February, 1898, to Henry E. Howland, Esq., President of the Board of Managers, No. 1 Madison avenue, New York city, at which time and place the Board will receive and open all proposals.

Drawings and specifications may be consulted and blank forms of proposals obtained at the office of the Board of Managers, No. 1 Madison avenue, New York city, and at the office of I. G. Perry, Architect, in the Capitol at Albany, N. Y. Separate proposals under each specification must be made and each bid must be enclosed in a separate envelope, and indorsed, respectively, "Proposal for electric wiring and fixtures for Cottages 4, 5 and 6, Group 'D,' Central Islip," and "Proposal for the consolidation of the Electric Lighting plants at Ward's Island."

GEORGE E. DODGE,
Secretary Board of Managers.

"Electricity and Water-Power,"
By REPLOGLE.
THE POPULAR NEW BOOK,
PRICE, $1.00.
PUBLISHED BY
Electrical Review Publishing Co.,
TIMES BUILDING, NEW YORK.

TO SELLING AGENTS.

A new company recently organized and at present engaged in equipping extensive and modern plant for the manufacturing of a large line of new and improved machinery for heavy steam plant work, desire to open correspondence with selling agencies, and dealers of experience in water-tube boilers, engines or electrical machinery, who are desirous of either adding to their present business or of making changes looking to more profitable connections. Everything offered by this company will be a distinct advance in efficiency and general merit over anything now on the market, and the new features by which such ends are attained will be entirely original. Fullest investigation solicited. Address, Box 438, Marion, Ohio.

DIRECT-READING AMMETERS
OR
VOLTMETERS,
Like cut, reading from 0 to 10, at $1.50 each. 0-25 at $5.00 each.
Cherry Electric Works,
25 & 27 3d Avenue, NEW YORK.

POSITION WANTED.
Wanted: To lease Electric Light Plant in some live town. Or would take charge of Plant for moderate salary and guarantee satisfaction. All 'round, PRACTICAL man, capable to install machinery. Will consider an offer of any kind. Reference A 1.
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Engine Men, Boiler Men and Steam Specialty Men

SHOULD HURRY. For the coming Electrical Show MORE space has ALREADY BEEN SOLD than the TOTAL sold at the 1896 Exhibition. Architects, Builders, Electrical Engineers, Stationary Engineers, Owners and Superintendents of Buildings will meet there.

It is not improbable that a million people will visit the Exhibition—every one with a wide-open, curious mind. We will help you to help us and help yourselves. Plans for the asking.

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MARCUS NATHAN, General Manager.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED JANUARY 18, 1898.

597,418, 597,419 Regulation of dynamo-electric machinery; F. A. Johnson, Binghamton, N. Y.—In a dynamo-electric machine, a polar face excited from two separate necks, coils on said necks for furnishing said excitation, and switches for separately varying the current in said coils.

597,424 Electric arc lamp; A. Mougin, Paris, France.

597,432 Electric car brake; C. F. de Redon, New York N. Y.

597,433 Electro-magnetic railway car brake; C. F. de Redon, New York, N. Y.—In a railway car brake, the electro magnet at each side of the car, and the pole piece extending from the end of said magnet, combined with the brake arm pivoted thereto, and the brake shoe for contact with the track rails, said shoe being capable of lateral motion in addition to its vertical motion.

597,467 Trolley car; J. D. Hull, New York, N. Y.

597,472 Electro-mechanical switch-operating mechanism; C. W. Squires, Springfield, Mass.

597,476 Electric furnace; T. L. Willson, New York, N. Y.

597,490 Car signal and indicator; A. Travaglini, Philadelphia, Pa.—In a device of the character described, a trolley pole, a star wheel journaled thereto, lugs on the feed wire to engage the star wheel, a sprocket wheel carried by the star wheel, a second sprocket wheel journaled in the car, a sprocket chain connecting the sprocket wheels and a station indicator operated by the second sprocket wheel.

597,508 Conduit for electric railways; C. V. Osborne, Dayton, Ohio.

597,516 Electric trolley device; G. Valley, Johnstown, Pa.

597,536 Signal telegraph; C. V. Boughton, Buffalo, N. Y.

597,556 Coin-controlling apparatus for telephones; W. Gray, Hartford, Ct.—In combination with the transmitter of a telephone apparatus a signal device located adjacent to the transmitter, the sound deflector leading from the signal box to the transmitter, the signal-locking tumbler, the coin-controlled signal rod normally locked, and a signal-sounding mechanism.

597,567 Transmission dynamometer; S. W. Robinson, Columbus, Ohio.

597,587 Telegraphic signals; J. Nicholson, Buenos Ayres, Argentina—Telegraph signals, having an uneven number of elementary motions for the vowels and accented vowels of the alphabet, and an even number of such motions for the consonants of the alphabet.

597,601 Electric arc lamp; E. Blaser, California, Mo.

597,642 Electric switch; E. M. French, Stoughton, Mass.

597,650 Electric lock and system of electric locking for securing additional safety in railroad signaling; J. F. W. Morris, London, England—In combination with locking device for use on railways, an electric contact maker and breaker comprising a cam with flattened surfaces, levers resting against the cam and spring contacts acted upon by the levers to complete or break the circuit of the locking device.

597,689 Keyboard telegraphic transmitter; S. Price, Paterson, N. J.

597,700 Circuit breaker; F. C. Robertson, Toronto, Canada.

Mica Mines in China.

United States Consul Fowler, of Ningpo, China, in a recent communication, writes as follows:

Vast untouched beds of sheet mica lie within 50 miles of Kiao-Chow Bay. The extent of these mica deposits is as yet unknown, but, so far as I have investigated, they promise to handsomely repay those who are fortunate enough to obtain a franchise for working them. The rolling, sandy hillocks, under which the mica lies, are but poor lands for cultivation, and hence their use for mining purposes detracts nothing from the cereal-producing capacity of the region. The mica crops out at intervals over some 50 square miles, and in veins sometimes 10 feet thick. Of course, much of it is discolored by foreign minerals, but what I have seen assures me that there are vast quantities of good commercial material.

A Street Railway Competition.

A London contemporary states that an international prize competition for the construction of a tramway, to be worked by electrical or other power, between Zumarraga and Zumaga, is advertised. The length of the line is about 29 miles. Specifications are to be obtained from, and papers addressed to, the Mayor of Aspeitia, Spain.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.
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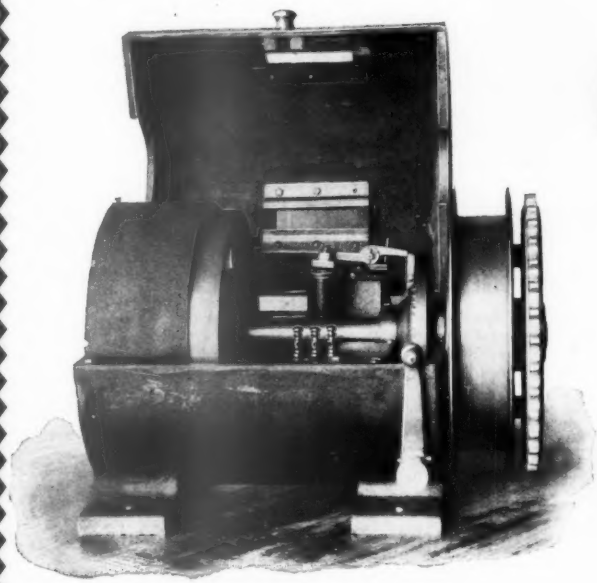

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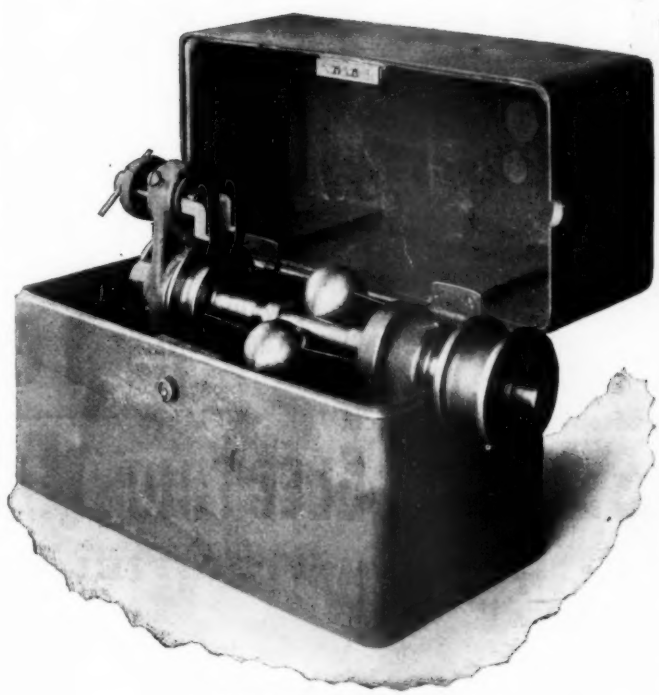

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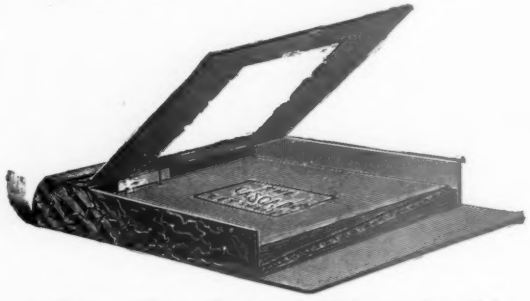

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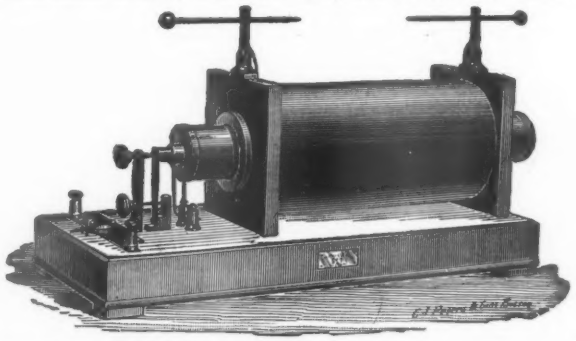

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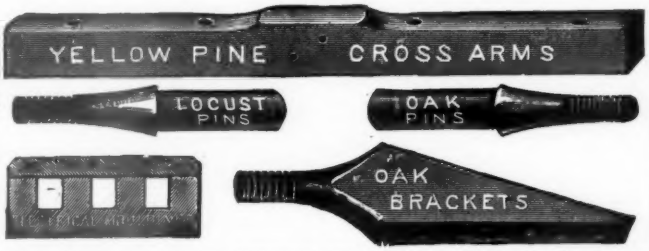

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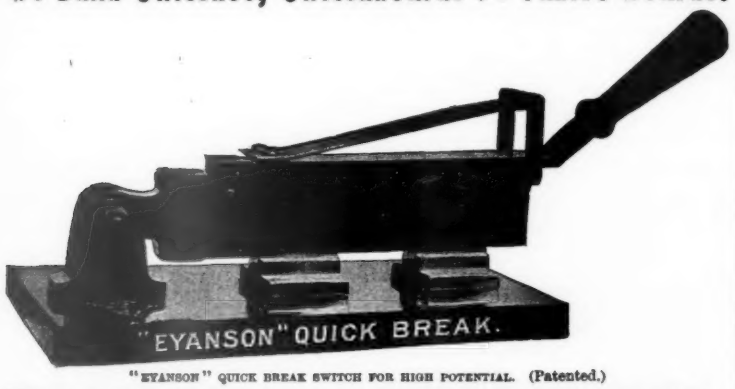

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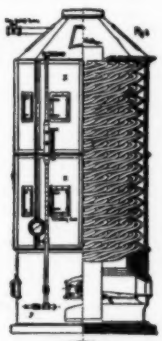

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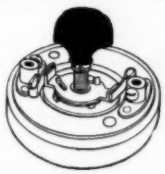

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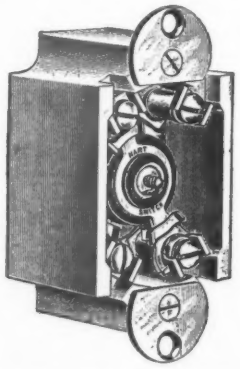

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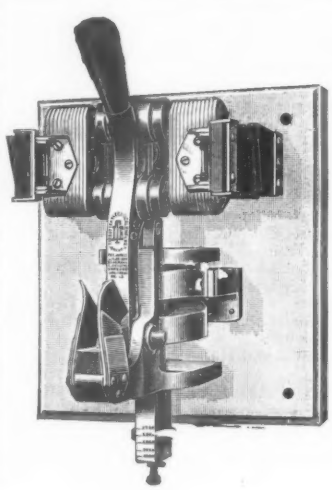

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